

The Canadian Medical Association Journal

SEPTEMBER, 1953 • VOL. 69, NO. 3

PEPTIC ULCER

J. A. MacFARLANE and
J. D. MILLS, *Toronto*

PEPTIC ULCER has been discussed in surgical literature almost continuously since the operation of gastro-enterostomy was first described. Innumerable papers have appeared on the various types of procedures and their results, their virtues and shortcomings. The physiologists have operated on countless numbers of animals in an attempt to understand the principles of the various types of operations.

One of the first duties I undertook shortly after joining the staff of the Toronto General Hospital, 25 years ago, was a survey of the results of gastro-enterostomy for duodenal ulcer. In those days we concluded that it was a safe operation and attended by reasonably good results. Although we may be now adding to that long succession of men who have reported the results of gastric surgery, and although it is probably of some value to set down the results of the work of several years, it may well be that at the end of another quarter of a century, men may look back in wonderment at the surgical efforts of this era, in the light of new discoveries, new conceptions, new understanding and new and more rational treatment of this trying and disturbing human ailment, peptic ulcer. It has always seemed to me that the surgical removal of a peptic ulcer, together with a rather large segment of an important digestive organ, although a triumph of surgical and technical development, is not a highly scientific exercise, and an altogether too literal application of the ancient adage: "If thy right eye offend thee, pluck it out."

I suppose it has been fairly well accepted, however, in most clinics, that if surgical treatment is indicated in the management of peptic ulcer, the most satisfactory procedure is partial gastrectomy. At the Veterans' hospital in Toronto, an effort has been made to review the results of this operation over the last 22 years. The

survey includes all the cases which came to operation from January 1, 1929 to January 1, 1951.

The total number under review is 413 cases, 74 of which were done up to 1946 and the remainder in the next 5 years.

TABLE I.

Total number gastrectomies.....	413
" " patients.....	411
" " analyzed.....	387

It will be noted that the following report deals with the results of one procedure, that is partial gastrectomy. Other operations have been used during that period. In the years 1946-1947, we carried out a limited number of simple vagotomies for duodenal ulcer, but our results were not encouraging, and this operation has not been

TABLE II.

TOTAL NUMBER GASTRECTOMIES BY YEARS			
Up to 1939.....	10	1945.....	10
1939.....	3	1946.....	10
1940.....	7	1947.....	36
1941.....	4	1948.....	47
1942.....	14	1949.....	70
1943.....	14	1950.....	75
1944.....	12	1951.....	101

used since 1948. It is true that we did not use it as does now the originator, Dr. Dragstedt, in combination with a gastro-enterostomy, so that our limited experience is not sufficient evidence on which to completely discard it as of therapeutic value. Certainly Dragstedt's method of selection of cases and his conception of no therapy is more soundly based on present day knowledge of physiological principles than are most of the many operative methods used throughout the past 35 years.

For the most part, men with peptic ulcer have been admitted to the medical wards of the Veterans' hospital for thorough examination and study. The surgeon sees only those cases which, in the opinion of the physician, have developed complications, or who can no longer be con-

trolled by dietary and other medical therapy. It is extremely important, when dealing with ex-service personnel, that the psychological and social history be considered in each case and, wherever possible, an effort is made to correct social or economic factors before recourse to surgical therapy.

The main indications for surgical interference were, of course, obstruction, repeated hæmor-

TABLE III.

TYPE OF ULCER		
Duodenal.....	268	69.2%
Gastric.....	74	19.3%
Combined.....	12	3.1%
Stomal following gastro-enter.....	23	6.0%
Stomal following gastrectomy.....	2	0.6%
G.J.C. fistula.....	4	1.0%
Esophageal.....	1	0.2%
No ulcer pathology.....	3	0.8%
Total.....	387	100.0%

rhage, repeated perforation and pain unrelieved by long periods of medical treatment and frequently of such a nature as to suggest penetration. In the cases of gastric ulcer, the general policy has been to advise operation in all cases where the lesion has failed to show radiological evidence of healing after a reasonable period of carefully supervised medical care.

TABLE IV.

INDICATIONS FOR OPERATION		
Pain.....	102	26.6%
Hæmorrhage.....	73	18.9%
Perforation.....	4	1.0%
Obstruction.....	60	15.5%
Gastric ulcer.....	72	18.6%
G.J.C. fistula.....	4	1.0%
COMPOUND INDICATIONS		
Pain and hæmorrhage.....	29	7.5%
Pain and perforation.....	15	3.9%
Pain and obstruction.....	13	3.4%
Hæmorrhage and obstruction.....	7	1.8%
Hæmorrhage and gastric ulcer.....	2	0.5%
Hæmorrhage and perforation.....	5	1.3%
Total.....	387	100.0%

In some of the earlier cases the records are not sufficiently complete to include them in this analysis. The indications for operation are surveyed in Table IV.

In the last two years under review, operation was undertaken for acute hæmorrhage in 5 cases. Four of these survived. The greater number of those in whom hæmorrhage is shown as an indi-

cation for operation, had one or more serious bouts of bleeding and were subjected to operation in an interval following recovery from their attack.

In Table V are listed the various technical procedures. In by far the greater number, anterior anastomosis of the jejunum to the stomach has been employed. It remains to be seen whether this method has anything to recommend it over the posterior or retrocolic procedures. It was initiated as a common practice at a time when stoma ulcer following retrocolic gastro-enterostomies presented particular difficulties at the second operation. In view of the small incidence of recurrent ulcer at the

TABLE V.

TYPE OF OPERATION		
Ante-colic polya.....	180	46.5%
Retro-colic polya.....	4	1.1%
Ante-colic Hoffmeister.....	25	6.3%
Retro-colic Hoffmeister.....	6	1.5%
Schoemaker-Hoffmeister.....	63	16.0%
Take-down G.E. and polya.....	24	6.1%
TYPE OF OPERATION WITH BANCROFT		
Ante-colic polya.....	76	19.3%
Retro-colic polya.....	2	0.5%
Ante-colic Hoffmeister.....	5	1.3%
Schoemaker-Hoffmeister.....	2	0.5%
Total.....	387	100.0%
% of Bancroft in series.....	85	22.0%

TABLE VI.

MORTALITY		
Up to 1946.....	6 out of 74	8.1%
1946 to 1951.....	3 out of 339	0.89%
Total.....	9 out of 413	2.2%

stoma after adequate gastrectomy, this would now seem to be an insufficient reason to prefer it. Moreover, some surgeons believe that the longer and somewhat dependent proximal loop in the anterior operation may be a factor in the "dumping syndrome".

Mortality.—As shown in Table VI the overall mortality rate was 2.2%. With the improvement in the preparation of patients and routine post-operative care, there has been improvement in this figure. In the years 1946-1951, the rate has been reduced to approximately 1%—3 deaths in 339 cases.

Technical failure has accounted for 5 of the 9 deaths. In all instances a leak occurred either

at the duodenal stump or at the line of anastomosis. Experience has shown that when such a catastrophe as a duodenal leak does occur, measures should be taken immediately to drain the abdomen and to establish a sump to the site of the leak, rather than to attempt a secondary closure.

The other 4 cases died from such complications as lung abscess, transfusion reaction with anuria, inferior vena caval thrombosis and acute yellow atrophy of the liver. And in one case, where no other cause but malnutrition was found

TABLE VII.

SURGICAL MORTALITY	
Total.....	5 cases
Blown duodenal stumps.....	4 cases
Leak at anastomosis with peritonitis.....	1 case
MEDICAL MORTALITY	
Total.....	4 cases
Lung abscess and empyema.....	1 case
Inanition.....	1 case
Transfusion mismatch.....	1 case
Acute yellow atrophy of liver.....	1 case

at post-mortem, there had probably been an incomplete preoperative correction of disturbed chemistry after long-standing symptoms of pyloric obstruction.

Survey methods.—Although the records of the department as kept for the past decade allow of 100% follow-up, there were certain cases admitted before and during the war which, for a variety of reasons, cannot be traced. In all 378 cases of the 413 gastrectomies (411 patients) were traced through a personal interview and/or a questionnaire (92%).

TABLE VIII.

Total number of gastrectomies.....	413
Operative mortality.....	9
Died of other causes since operation.....	14
Total available for follow-up.....	390

Fourteen had died of causes other than those which might be attributable to their original disease. Moreover, on their files there was sufficient information to gain some knowledge of the success of the operative procedure. Although there was no evidence in any of these of recurrence or serious complications, they are not included in the survey. The tables that follow will vary somewhat in the totals shown; 364 answered the questionnaire; 328 returned for x-ray

examination; 295 were interviewed and their answers to the questionnaire were checked, their weight recorded, hæmoglobin determined, a chemical estimation was carried out on a sample of the gastric contents and they were subjected to a physical examination with particular reference to the condition of the abdominal wound. Careful attention was given to the man's ability to work, whether at his previous occupation or new employment.

It will be evident from the accompanying table that there was a high late morbidity incidence from various causes, but by far the highest cause of disability was some degree of the so-called post-gastrectomy syndrome which is discussed in another paper.* Eight cases had pain for which no reason could be found, either by careful consideration of the symptoms or by radiological or physical examination. In view of the very low proved findings of stoma ulcer in this series, it may be that these men or some of them, will sub-

TABLE IX.

TOTAL REMOTE POSTOPERATIVE MORBIDITY		
Pain.....	8 cases	2.2%
Incisional hernia.....	8 "	2.2%
Small bowel obstruction.....	4 "	1.1%
Anæmia.....	2 "	0.5%
Stomal ulcer.....	2 "	0.5%
Dumping syndrome (all types).....	83 "	22.8%
Total.....	107 "	29.3%
(of 364)		

sequently prove to have this complication. Eight others suffered varying degrees of weakness in their abdominal wall. None needed operation but were carrying on with supporting belts. Four had suffered small bowel obstruction, which had been relieved successfully by operation. Only two cases had suffered any serious degree of anæmia. Both were easily controlled by iron and/or liver. There were two cases which suffered from recurrence of ulcer at the stoma and these men had a further segment of their stomach removed.

In 328 cases which were sent for radiological examination, the reports did not prove to be very informative. In no case was the presence of ulcer pathology demonstrated, neither did this method aid in determining the cause of symptoms in those who were suffering from continued pain or the post-gastrectomy syndrome.

*J. D. Mills: "The Post-gastrectomy Syndrome", this issue.

A test meal was carried out in 294 cases and showed free acid in only 28, and the average figure was well under 20 units.

There was significant loss of weight in 62.6% of the number of patients interviewed. We have not undertaken any metabolic studies to de-

TABLE X.

Follow-up	G.E. series	X-ray
Follow-ups.....		328
% follow-ups.....	328 of 390	84.0%
2 cases of abnormal x-ray findings		
1 partial retention in proximal loop.		
1 suspected stomal ulcer—later not present.		
% of pathological findings—0.5%.		

termine the reasons for this loss. It is in keeping with other reports and the general experience of surgeons in this field.

The results of the questionnaire asking for the patient's own estimation of relief are shown in the accompanying table.

Those who admitted marked improvement, as we shall note in another table, included a certain

TABLE XI.

FOLLOW-UP GASTRIC TEST MEALS		
Follow-up.....		294
% follow-up 294 of 390.....		75.0%
Free acid found in 28 cases.....		9.5%

number who had mild degrees of nausea. The 49 who had slight improvement also included many who were suffering some degree of nausea. It also included a small number who complained of fatigue, who were reluctant to return to work and extremely pension conscious. The ten who were worse are suffering from severe degrees of dumping syndrome.

TABLE XII.

POSTOPERATIVE WEIGHT CHANGES		
Gain in weight.....	101	29.5%
Loss in weight.....	213	62.6%
Same weight.....	27	7.9%
Total.....	341	100.0%

Only 350 committed themselves to answering the questions related to work. When one considers the psychological implications of pensioners or those who possibly may become pensioners, the percentage of definite answers is really very satisfactory. 63.2% of those who answered (350) had returned to the same employ-

ment. 11.7%, who for various reasons did not work before operation, did not work since their operation.

Many of these were the recipients of war veterans' allowances and, having been certified once as being eligible for relief, no effort has

TABLE XIII.

QUESTIONNAIRE		
<i>Patient's assessment of operative result</i>		
Complete relief.....	130	35.8%
Marked improvement.....	175	48.8%
Slight.....	49	13.4%
Same or worse.....	10	3.0%
Total.....	364	100.0%
% of follow-ups.....	364 of 390	93.0%
No difference with type of operation		
Total % cure on patient's assessment		
—35.8	—	48.8—84.6%

been made to have them disqualified. In many instances, the reason for their qualification was other than peptic ulcer, arthritis, heart disease, etc.

TABLE XIV.

POSTOPERATIVE WORK HABITS		
Same employment.....	221	63.2%
Same unemployment.....	41	11.7%
Lighter work.....	86	24.5%
Unable to work.....	2	0.6%
Total.....	350	100.0%

Nearly a quarter of the group had sought and obtained lighter work. Nearly all these are suffering or have suffered some degree of "dumping" syndrome. The two who cannot work are suffering from a severe degree of this complaint.

TABLE XV.

CASES OF SAME UNEMPLOYMENT.... 41		
Too old.....	29	56.2%
Other disease.....	9	21.9%
Will not work.....	9	21.9%
Total.....	41	100.0%

CONCLUSION

1. Over a period of 22 years at the Veterans' Hospital in Toronto, the operation of sub-total gastrectomy has been performed 413 times for peptic ulcer. The overall mortality rate was 2.2%, but with improved preoperative prepara-

tion and postoperative care, a mortality rate of less than 1% has been achieved in the last 5 years under review (3 deaths in 339 cases).

2. 364 of the 388 patients who were alive in December 1951 were available for review (93.5%).

3. As judged by the patients' opinion, 305, or 84.6% were either markedly improved or completely cured of their original symptoms.

4. A more careful analysis, however, revealed a high incidence of post-gastrectomy syndrome and certain other disabilities. 16 cases had symptoms of such long standing and severity as to warrant consideration of some further operative procedure to relieve them.

5. Two cases developed ulceration at the

stoma and required the removal of a further segment of their stomachs.

6. Of 350 veterans, with an upper age limit of 75, who submitted information on their ability to work, 221 had returned to their usual occupation, and 86 were at work but had obtained somewhat lighter employment.

Total percentage working, 87.7%.

The collection of statistics and the follow-up data included in these three papers has been made possible by the enthusiastic and careful work of a succession of resident surgeons, namely, Drs. S. Kling, J. W. Spence, B. Wilson, Alex Sinclair, Alex MacIntyre, and W. J. McCracken.

The operative work has been carried out on the wards of the service of General Surgery at Christie Street and Sunnybrook Hospitals, presently directed by Dr. J. D. Mills, with the attending surgeons Drs. C. Watson, F. Mills, H. Norman and C. Day.

THE POST-GASTRECTOMY SYNDROME

J. D. MILLS, M.D., *Toronto*

OUR INTEREST in the post-gastrectomy syndrome was precipitated by the criticism of our medical colleagues, of some of our results following gastrectomy. They repeatedly brought to our attention the fact that some of our patients who had returned to their Clinics after operation, were not well.

We, therefore, undertook a study of these patients and a review of the literature on this subject. From this study we came to the conclusion that until recently, neither the severe character nor the frequency of the symptoms due to the post-gastrectomy syndrome has been fully appreciated. This may be due to two or three factors, but inadequate follow-up has been the main cause in our series.

In our hospital, patients in this category were referred directly from the Out-patients Department to the medical service for treatment. Our medical colleagues were then reluctant to refer them back to us because of their feeling that we had little to offer from further surgical treatment. We, therefore, did not appreciate the severe disability from which some of these patients suffered until we ourselves undertook a detailed review.

Then there is the reluctance on the part of the surgeon himself to admit a poor result. He has

in his opinion performed a good operation accepted as the treatment of choice for peptic ulcer. For a long time I had more than a tendency to minimize the symptoms of these people. It is certain that a number, because of the severity of their symptoms and their failure to obtain worthwhile advice and treatment, have changed their medical advisers completely and so contact with them has been lost.

The conclusions we have arrived at (Table I) are based on the postoperative study of 364 gastrectomies performed during the period 1929

TABLE I.

Gastrectomies performed (1929-1951)...	413	100.0%
Cases followed up.....	364	88.0%
Total cases dumping syndrome.....	83	22.8%
Cases severe dumping syndrome.....	16	4.4%
Cases mild dumping syndrome.....	67	18.4%

to 1951. It is estimated that 83, or 22.8% suffered from some degree of the syndrome; 16 or 4.4% from the severe type, and 67, or 18.4% from the mild type.

We feel that those suffering from the syndrome may be roughly divided into two groups, the severe and the mild, with, however, many gradations between the two groups.

The symptoms may occur anywhere from fifteen minutes to one hour after taking food. The patient states that following a meal, he becomes hot, perspires, his heart pounds, he feels weak and nauseated and must lie down. He may vomit anywhere from one mouthful to several

cupfuls of bile, with sometimes a small amount of food in the terminal part of the vomitus. Vomiting of bile may occur as many as four times during the day, occasionally at night.

In the severe type, in a high percentage of cases, there is a reluctance to take breakfast. The taking of anything that would resemble a normal breakfast tends to upset them for the whole day. They have nausea, bile regurgitates into the throat and mouth, is bitter to the taste and generally upsetting. Very little food is taken until the evening meal, which is the best meal of the day. There is loss of weight and morale and often inability to carry on with remunerative work.

From the severe type there is gradation to the mild, with various degrees of vomiting of bile and other symptoms similar to those complained of in the severe type. Fortunately many of this group tend to improve as time elapses after the gastrectomy, so that in one to two years they are well and have become automatically relieved of their symptoms.

In the mild type the symptoms are similar, but may occur much later after the meal. There is no vomiting. These people state they feel better if they are able to lie down for half an hour following meals, and by so doing, may completely abort an attack. They have no major disability and are able to carry on at their work quite satisfactorily.

We are concerned with the treatment of this condition as a whole, but more particularly with those suffering from the severe type, who are indeed greatly disabled and are often urgently in need of some definitive treatment. Some of the alleged causes of the syndrome are: (1) Rapid absorption of carbohydrate with resultant hyperglycaemia followed by a hypoglycaemia. (2) Sudden dilatation of the jejunum due to rapid emptying through the stoma, resulting in the signs and symptoms of the syndrome. (3) Hyperperistalsis in the small intestine. (4) The proximal loop not being placed high enough along the line of anastomosis, allows a regurgitation of food into this loop. (5) Obstruction in the afferent loop causing a drag on the stomach and loop.

There are other theories which have been brought forward in an attempt to explain this distressing condition, but where so many have been suggested, it is unlikely that any one of them offers the correct explanation. A great deal

of work has been done by many people, particularly in regard to the hyperglycaemic-hypoglycaemic theory.

It would seem desirable to give a short summary of these investigations.

Symptoms usually occurred following their ordinary meal and after glucose tolerance tests, during the time at which the sugar concentration was elevated.^{1, 2} The symptoms did not occur, as a rule, during the hypoglycaemic period. The dumping symptoms were reproduced by the administration of glucose and sucrose orally, but not when glucose was administered intravenously. The symptoms were reproduced in individuals with intact stomachs, as well as in patients who had been subjected to sub-total gastrectomy, by the intrajejunal installation of hypertonic solutions of glucose, protein and sodium sulphate and by distension of the jejunum with an air-inflated balloon.³

These observers conclude that early post-prandial dumping symptoms are due to the distension of the jejunum by fluid which enters the lumen of the gut from the blood stream in response to the presence of a hypertonic solution formed from the ingredients of a meal, possessing osmotic properties and not to distension by the bulk of the ingested food. They are not caused by hyperglycaemia, though a hyperglycaemia may be present during the period of symptoms.

Other observers⁴ have found that the introduction of hypertonic solutions of glucose, plus barium, into the efferent loop immediately beyond its anastomosis to the stomach, has resulted in a hyperperistalsis in the whole of the small intestine; so that in one case the barium-glucose mixture reached the hepatic flexure of the colon in as short a time as five minutes. In the other cases, seventeen minutes was required for the mixture to reach the caecum. Ordinary barium introduced in a similar manner required two hours to reach the caecum.

These experiments were carried out in a sufficient number of cases to warrant the conclusion by these investigators that the symptoms were caused, not by dilatation of the jejunum, but rather by hyperperistalsis. In all of these cases, marked degrees of the dumping syndrome were initiated by the introduction of the glucose-barium mixture into the efferent loop; so it is to be seen, that many solutions and explanations have been offered to account for the syndrome, all of them apparently having some merit. While these many theories have been advanced, very few concrete suggestions have been made regarding treatment.

Capper⁵ states that the syndrome is due to obstruction in the afferent loop at the point where it joins the lesser curve, so that there is a weighty accumulation of bile and pancreatic juice in the loop causing a drag on the stomach and loop. He states that he has cured 7 of 8 patients suffering from the syndrome by suturing the loop to the stump of the left gastric artery and to the remnant of the gastro-hepatic ligament along the under-surface of the liver. He speaks of suturing the loop to the fascia overlying the common duct. It is obvious that he is referring to cases in which a long afferent loop has been employed. In our early gastrectomies we employed a long afferent loop as a routine and tacked it to the stump of the left gastric artery and to the fringe of the gastro-hepatic

ligament. We found this latter structure to be extremely fragile and at times almost non-existent. In spite of this precaution complete obstruction necessitating operative interference occurred in 2 of my own cases and in 2 which had been done elsewhere. A long loop had been employed in all four. Since this experience a short loop has been used and no further trouble in the afferent loop has occurred. I am prepared to concede that many degrees of obstruction could occur in the long afferent loop. In any case this would be relieved by the surgical treatment we are about to suggest.

Capper has reviewed 660 gastrectomies in which the syndrome followed all types of gastrectomy with almost equal frequency except the Billroth I. This included both anterior and posterior anastomoses, so that doing a posterior anastomosis is not the answer. Fallis⁶ reports 150

lowest blood sugar levels. They began in all instances prior to the peak of the curves and reached maximum intensity as the curve was on the down-grade and continued up to two hours post-prandial into the time where the blood sugar approached the fasting level. It is to be noted that in this group none of the curves reached significant hypoglycæmic levels. Symptoms in every case proved to be more severe after an ordinary meal than following the administration of glucose orally, although the blood sugar levels were comparable.

Fig. 3 shows curves obtained from the patients who had undergone surgical treatment for the syndrome; as in the first two, after meals and after the administration of glucose. The blood sugar levels again were essentially normal; although it might be noted that lower blood sugar levels were observed in the postoperative

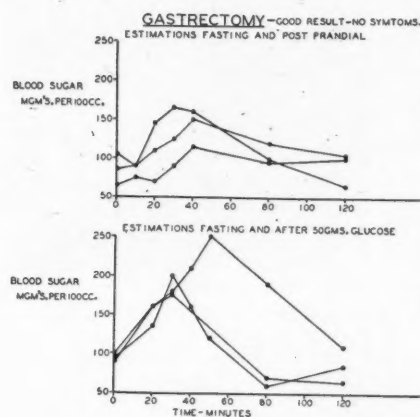


Fig. 1

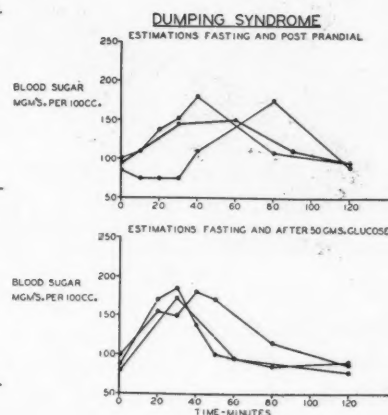


Fig. 2

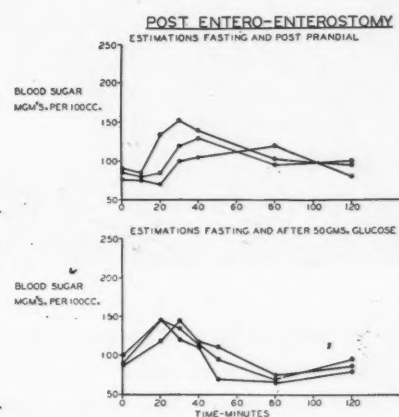


Fig. 3

Billroth I operations following which there was complete freedom from the syndrome. He was able, however, to do this type of gastrectomy in only two-thirds of his patients.

We have carried out a limited investigation regarding the hyperglycæmic theory. Fig. 1 shows blood sugar curves obtained from patients who are symptomless following gastrectomy. The first set of curves shows blood sugar estimations during and following an ordinary meal and the second set following administration of 50 grams of glucose. These represent normal curves and produced no symptoms.

Fig. 2 shows curves obtained from patients suffering from the syndrome. Again the estimations were taken following a meal and after glucose administration. These curves are also essentially normal. Maximum symptoms did not occur in this group at the time of highest or

group. Nevertheless, symptoms had been completely relieved.

In view of the results obtained in these few cases, it was felt that further study along these lines would be wasted effort.

Radiological investigation has been carried out by giving meals consisting of an ordinary breakfast—porridge, egg, toast and coffee, but with barium added at frequent intervals during the meal. For comparative purposes, meals were given to those patients who had had a good result after gastrectomy and to those suffering from the syndrome. These patients were observed under the fluoroscope from the time the first mouthful of this mixed food and barium meal was taken until one-half hour following the completion of the meal.

Spot films were taken at frequent intervals and one-half hour films until the stomach was empty.

This investigation has proved that there is no difference in the emptying rate of patients suffering from the syndrome as compared to those who have had a good result following gastrectomy. An occasional small amount of barium was found to enter the proximal loop, but this loop did not fill or become distended with barium.

In some cases a bolus of barium-mixed meal has been observed under the fluoroscope to regurgitate back into the stump of the stomach. This back and forth movement of a bolus of food from the efferent loop to the stomach has been observed to occur many times in the same case, and occurs in over 50% of those examined,

the function of the resected pars media and pyloric end of the stomach.

The theory we wish to submit hinges upon two main assumptions. First—that there are certain individuals whose stomachs will not tolerate the presence of bile. Second—a good gastrectomy removes from two-thirds to three-quarters of the stomach, leaving a stump which now has the capacity of one-quarter to one-third of its preoperative size. This stump of stomach must accommodate, at each meal, food and liquid plus digestive juices.

Due to the mechanical reconstruction following gastrectomy, (Fig. 7A) bile and pancreatic

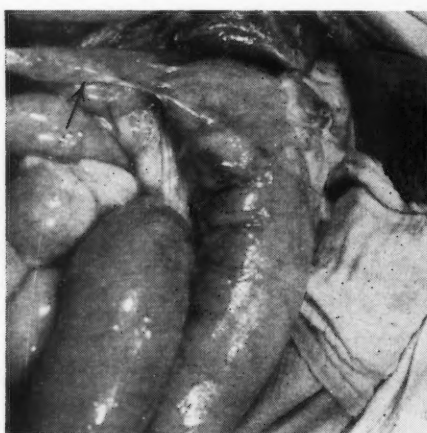


Fig. 4

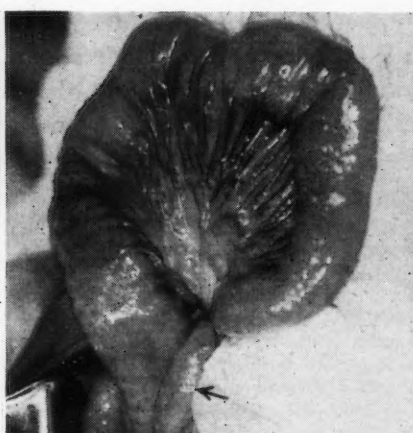


Fig. 5



Fig. 6

both in those who are symptomless as well as the ones suffering from the syndrome. At operation the efferent loop has been found to show some degree of dilatation and hypertrophy varying from slight to a rather marked degree. It is safe to say that 75% of the cases operated upon have shown the efferent loop to be substantially dilated and hypertrophied, some of the operative notes describing a loop twice the size of the normal jejunum. This dilatation usually is widest in the first 8 to 10 in.; that portion of the loop immediately distal to the greater curve, and gradually tapering off to normal, at about 18 in.

Figs. 4, 5 and 6 show the various degrees of dilatation from slight to marked, as well as the small size of the afferent loop as compared to the efferent.

One would judge that the back and forth movement of a bolus of food from the jejunum to the stomach taken together with the rather constant finding of some degree of dilatation and hypertrophy in the efferent loop, might be interpreted as meaning that the jejunum is endeavouring to take on, in some degree at least,

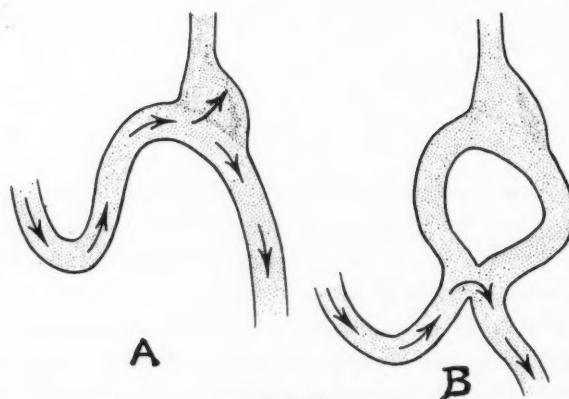


Fig. 7

juices must pass through the stump of the stomach before entering the efferent loop. This volume is augmented by gastric secretion from the stump of the stomach and saliva. I am assured that a conservative estimate of combined bile and pancreatic secretion in 24 hours amounts to from 2,000 to 3,000 ml. A high percentage is secreted at meal-time and during the day. The volume of these juices, plus food and liquid ingested, is more than the reduced capacity of the stomach can accommodate. Therefore, vomiting

occurs to relieve the over-distended stump of the stomach and efferent loop. In this connection it is to be noted that the secretion of both bile and pancreatic juice is greatly stimulated by the ingestion of concentrated carbohydrates. This may have a bearing on the inability of some of these patients to eat such foods as chocolate bars and candy; this high degree of stimulation having the same effect as the taking of food in that the stump of the stomach and jejunum are suddenly flooded with a large volume of bile and pancreatic secretions, with perhaps fluid gained by osmosis.

In substantiation of this theory, many cases of mild syndrome, occurring shortly following gastrectomy, recover after a year or so following a compensatory dilatation of the stomach and jejunum.

TREATMENT

On the basis of the above theory, medical treatment should be based on an attempt to avoid the ingestion of large quantities of food or liquid at any one time. The tendency on the part of all concerned is to revert to the old liquid regimen, of the various Sippy diets containing considerable quantities of fluids. This is undoubtedly wrong for we are not now treating an ulcer. The treatment should, therefore, be a dry, rather than a liquid diet, consisting of at least four or five feedings instead of three. No liquids should be taken during meals, all being taken between meals. If the stomach will not accommodate both bile, pancreatic juices and food at the same time, some means of disposing of these juices ahead of the meal must be sought.

It has been found that a carminative mixture, given one-half hour before meals, tends to trigger the gall-bladder and stimulate the production of pancreatic juices and thus get these juices over and through the stomach ahead of the meal, which is the normal physiological situation before the stomach has been resected. Some of our patients have used beer for this purpose (for a time our reaction to this statement was, to say the least, skeptical).

These measures often help in the severe cases and are sufficient in the moderate cases, to allow the patient to carry on at his usual occupation without too severe a handicap. There are cases, however, where no medical treatment helps, and where something radical should be done should it offer any real hope of improvement.

The surgical treatment.—Again on the basis of our theory, it is obvious that an entero-enterostomy between the afferent and efferent loops, (Fig. 7B) would obviate the necessity of bile entering the stomach at all, and so eliminate its irritating effect, if any, and the necessity of the stump of the stomach accommodating the digestive juices.

This operation was not undertaken without misgivings. The alkaline medium in the stomach following gastrectomy has always been considered to be advantageous, and the presence of bile, it was felt, had perhaps a good deal to do with maintaining this alkalinity. We thought, however, that nothing much was to be lost in operating on the first two cases. Their symptoms were so severe that nothing could make them much worse. They were unable to work because of the vomiting of large quantities of bile, continuous nausea and other associated symptoms. One was an alcoholic, who is now, unfortunately, able to consume all the alcohol he desires without digestive upset. The other is an inadequate individual who was in serious digestive trouble of a similar character. Both have been operated upon with what we considered to be excellent results. During the past two years 12 cases in all have been treated surgically.* Ten are considered cured. The 11th case does not vomit, but complains of some abdominal discomfort and distension during the course of his meal. He is vastly improved. The 12th patient still vomits and states he has had very little benefit from his operative treatment.

We were naturally interested to know what effect short-circuiting of the alkaline juices would have in reducing the alkaline medium in the stomach. Test meals were carried out on all of these people before and after operative treatment. In every instance the alkaline medium of the stomach remained as such. In no case was there found to be free acid in the gastric content following entero-enterostomy.

The actual entero-enterostomy itself consists of a side-to-side anastomosis at approximately 8 to 10 in. below the junction of the efferent loop and the greater curve in the dilated portion of this loop, to the most available part of the afferent loop, as near the ligament of Treitz as possible. We feel a liberal stoma should be made. Ours have approximated three finger-

*Since this paper has been written three further cases have been treated by entero-anastomosis. Immediate results in these cases seem satisfactory.

breadths in width, as near as we can judge. An interesting fact is evident in that the only case, in which a poor result was obtained, was one in which a smaller-than-usual stoma was made, and placed closer to the stomach.

In conclusion it would be our opinion that no matter whether the theory which has been advanced is the right one or not, we feel that the short term results of an entero-enterostomy per-

formed in 12 cases, demonstrates sufficiently that the surgical treatment suggested is satisfactory in a high percentage of cases.

REFERENCES

1. MACHELLA, T. E.: *Ann. Surg.*, 103: 145, 1949.
2. *Idem*: *Gastroenterology*, 14: 237, 1950.
3. MUIR, A.: *Brit. J. Surg.*, 37: 165, 1949.
4. GLASEBROOK, A. J. AND WELBOURN, R. B.: *Lancet*, 1951.
5. CAPPER: *Brit. M. J.*, Aug. 1951.
6. FALLIS, L. S. AND BARRON, J.: *J. Oklahoma M. A.*, Sept., 1952.

PREPYLORIC EXCLUSION IN THE OPERATION OF GASTRECTOMY FOR DUODENAL ULCER— THE BANCROFT PROCEDURE

J. D. MILLS, M.D. and
W. J. McCracken, M.D., F.R.C.S.[C.],
Toronto

EARLY IN THIS CENTURY it became recognized that in certain cases where large duodenal ulcers had invaded the pancreas, or the surrounding oedema or fibrosis had involved the common bile duct, gastrectomy with section through the duodenum could not be performed without a certain amount of danger.

Von Eiselsberg¹ has been credited with the first exclusion operation said to have been performed in 1890. As early as 1919 Finsterer² devised the method of transection of the stomach proximal to the pylorus, leaving a small portion of the pyloric antrum *in situ*. Finsterer first suggested excision of the mucosa, but later abandoned this so that references to the Finsterer operation now imply that the mucosa has not been excised and that the antrum has been excluded plus its mucosa. Devine,³ in 1928, brought forward his exclusion operation which consisted of transection of the stomach, leaving the antrum *in situ*, together with its mucosa. The operation was completed by gastro-jejunal anastomosis without resection of any part of the stomach. This procedure was followed by so many anastomotic ulcers that it soon fell into disrepute as a treatment for peptic ulcer. The Bancroft procedure, in reality, is Finsterer's first method of excluding the pyloric antrum with excision of mucosa. It is to be noted that in his first article, published in 1932, Bancroft⁴ makes no claim to originality.

SURVEY OF DUODENAL STUMP CLOSURE

It is now accepted by the majority of surgeons who have had extensive experience in gastric surgery, that some compromise procedure must be undertaken in a certain percentage of cases in lieu of section through the duodenum. There are still those, and we are certain they are a definite minority, who believe that the ulcer must be removed in every case. Hinton⁵ adheres to this belief, but reports 4 deaths in 102 cases. Bartels and Dublin⁶ hold a similar view, but report a mortality rate of 28% in their first 50 cases, a mortality of 8% in their second 100 cases and, finally, 4.5% mortality in their 1941-45 series.

Rienhoff⁷ reports five deaths in 260 cases, a mortality rate of 2%. In only one of these, he states, was death due to faulty operative technique. In this case there occurred sloughing of the duodenum which had been mobilized too far down from the head of the pancreas, for ulcer in the region of the Ampulla of Vater. As a result of this experience he believes that extensive mobilization of the duodenum should not be done, as it is his opinion that regardless of whether the ulcer is excised or not, it would heal *in situ* after side-tracking of the gastric stream.

Steinberg⁸ makes the statement that he believes removal of the antral mucosa is essential. He quotes no figures to substantiate this opinion.

Arthur Allen⁹ reports 20 cases in which the Bancroft procedure was employed, and in which the results were equally as good as those following transection of the duodenum in the classical manner. He believes this manner of dealing with ulcers of the type under discussion is excellent, providing a radical high resection of the stomach is employed.

He bases his conclusions on the evidence deduced from his experience in operating on 9 cases in which the Finsterer procedure was employed, that is, without removal of the antral mucosa. Five of the 9 cases operated upon by this method developed anastomotic ulcer. Three of them were subsequently operated upon and treated by the removal of the antral segment only, with apparent good results.

Shapiro and Robillard (as quoted by Marshall¹⁰) conclude that the most prevalent complication following gastrectomy is leakage of the duodenal stump. This is believed to account for most of the mortality, which ranges from 2 to 30%. The authors dissected 62 bodies, described the anatomy of the pancreatico-duodenal vessels, and concluded that the procedure of duodenal mobilization from the pancreas might devascularize the stump sufficiently to interfere with healing.

Garlock,¹¹ reporting on 187 gastrectomies with a mortality rate of 2.1%, believes that the Bancroft procedure should never be used. He believes in cases where there is extensive peri-duodenal and peri-pyloric inflammation and distortion, that it is impossible to be sure this coring-out process thoroughly removes the mucosa from the pyloric ring. He considers this a serious defect in this procedure, and that a complete removal of the antral mucosa is essential.

He does not apparently perform any alternative procedure, but dissects out the duodenum in each case. He concludes as follows: "Whenever there has been extensive retroperitoneal dissection in the region of the duodenum or pancreas, we always insert one Penrose drain to the subhepatic region. This is removed on the seventh or eighth day. We are firmly convinced that the use of a drain where extensive denudation has resulted has materially decreased our incidence of post-operative abdominal complications. There can be no question of the fact that some localized pancreatic necrosis follows extensive dissections made necessary by posterior penetrating ulcers. When catgut is used for the duodenal closure, the liberation of pancreatic enzymes causes rapid digestion of the catgut resulting in a high incidence of duodenal stump breakdowns. Fine nonabsorbable suture material is excellent insurance against this complication. Drainage of the subhepatic area is an added safeguard."

Lahey¹² adheres to the principle that it is desirable to remove the ulcer in all cases, and one cannot help but agree with him when he says, "The mortality of duodenal ulcer is not that of sub-total gastrectomy, but of the relation of the duodenal ulcer to the head of the pancreas and to the common bile duct." In his article published in June, 1952, he reports an experience with 1,600 gastrectomies and describes the highly technical procedure of mobilization of the duodenum, of opening the common bile duct and insertion of a T-tube with a long arm for identification of its point of entry into the duodenum, and even an occasional section and anastomosis of the duct at a new site. These procedures have been instituted in the belief, as has been noted above, that it is highly desirable to remove the ulcer in every case, and in order to secure enough flexible duodenal wall for safe inversion.

He confesses, however, that there are certain cases in which this plan is not feasible, and suggests that some alternative procedure must be employed. He is averse to the use of any exclusion operation and describes the Bancroft as a messy procedure. He prefers to perform an anterior gastroenterostomy plus complete vagotomy in such cases. He refers to the McKittrick procedure in which gastroenterostomy is performed, and later, after the inflammatory reaction has subsided in the duodenum and pyloric end of the stomach, a second operation is done and a gastrectomy performed.

We believe that the highly technical procedure of mobilization of the duodenum and common duct, as described by Dr. Lahey, is undoubtedly a good one in his hands, as the mortality rate in these 1,600 cases is stated to be 2.57%. Is it possible, however, that he would advocate the teaching of this technically difficult procedure to the relative novice in surgery who is undertaking postgraduate work? Surely some less difficult and less complicated manoeuvre which could be reasonably expected to obtain the same result, might be employed. After all, an operation, to be a good one, must be one which can be undertaken by an average well-trained surgeon, so that at least from a teaching standpoint we do not believe that the procedure should be advocated or perhaps undertaken even by those of us who have had considerable experience in gastric surgery. We believe this procedure to be unnecessary, considering the results

which may be obtained by the simpler, perhaps at times difficult, but equally efficient Bancroft operation.

Gavin Miller¹⁴ in reporting on 1,000 resections, for which he gives no mortality rate, does not believe in any exclusion operation, and describes his own method of dealing with the duodenum. He is apparently able to transect through this structure in every instance. "The duodenum is cut across just distal to the pylorus. No clamps are used because of the devitalization to the duodenal wall. The pylorus is closed with Kocher forceps and covered with gauze sponge. The surgeon then closes the duodenal stump by approximating the mucosa with continuous suture of 000 chromic catgut, inverting it with a second similar layer, and then turning the stump into the capsule of the pancreas with interrupted fine silk and covering it with omentum." We are familiar with the manoeuvre of using the unscarred anterior duodenal wall to roll in the suture-line to the capsule of the pancreas, particularly where there is a paucity of free posterior duodenum, but this of course, has not always been possible in this series.

In a general survey of 413 gastrectomies at Christie Street and Sunnybrook Hospitals there have been several interesting observations, and it has been instructive in the light of varying opinions from other clinics, to find that of 280 cases in which the operation was carried out

TABLE I.

Total gastrectomies	413
Total cases for duodenal ulcer	280
Total mortality: 6 of 280	2.1%
4 duodenal leaks in 280 cases	1.4%
2 fatal cases, other causes	0.7%

for duodenal ulcer, the Bancroft procedure was used in 29.6% (85 cases). This is a considerably higher percentage than in any recorded series which has been examined, and naturally gives us reason to pause and re-examine our results and the justification for the continued use of this manoeuvre.

The general mortality rate in the series of gastrectomies under review, 413 cases, was 2.2%. In 280 cases, in which the pathology was duodenal ulceration, there were 6 deaths, 4 from blown stumps and two from other causes. It is obvious that one of the first considerations of comparative procedures in this particular pathological entity, duodenal ulcer, must be on the basis of the technical difficulties in the closure of the duodenal stump—a leak from this source is indeed one of the most important causes of catastrophe. In this group of 280 cases, 4 men died from this cause. Considering the fact that all cases which came to operation were carefully selected after long periods of medical care, and only those who suffered from complications

underwent operation, there was a mortality rate of 1.4%; although far from leaving one with a sense of security, it compares favourably with other series.

There were another 4 cases which leaked from their closed stumps, but fortunately prompt recognition and drainage of the area handled the situation and they survived. These 8 cases, in a total of 280 under the various methods used at operations, suffered the complication of perforated stumps. It is also true that 5 of the leaks were in a group of 85 in which the section was prepyloric, whereas only 3 were in the remaining 195. However, it must be kept in mind that those cases in which the Bancroft procedure was employed were the technically difficult closures.

These facts require further examination and some comment on technique and principle by which we are or should be guided in deciding on the procedure to be adopted in cases where

TABLE II.

280 CASES DUODENAL ULCER		
280 cases duodenal ulcer in series....	of 387	72.3%
Total mortality:.....	6 of 280	2.1%
Mortality due to blown stump.....	4 of 280	1.4%
Total blown stumps.....	8 of 280	2.8%
Blown stumps in Bancroft.....	5 of 85	5.9%
Blown stumps in other cases.....	3 of 195	1.5%

adherence to, or penetration of the pancreas is suspected. In many instances a careful study of the history will give an indication of whether penetration is likely to be present. A very careful estimation of the pathology should be made before a final decision is made as to the type of procedure which is safest for that particular case. The area of the pylorus and the first part of the duodenum should be examined both by anterior palpation and through an opening in the lesser sac. The character of the ulcer, the amount of induration or oedema, and the degree of involvement of a posterior ulcer in the head of the pancreas, must be carefully considered. The free edge of the gastro-hepatic ligament should be examined and the relationship of its duodenal end to the induration surrounding the ulcer, should be carefully studied, and the degree of dissection required to free the posterior ulcer from the head of the pancreas, assessed. If there is any doubt in the mind of the operator about his ability to free the duodenum and close it by transection, the Bancroft pro-

cedure should be employed without hesitation. Most injuries to the common duct occur because of ill-advised dissection in an attempt to use the standard procedure in closing the duodenum.

The operator must always remember that after having destroyed the blood supply of the pyloric end of the stomach as a preliminary to the excision of the ulcer, he cannot then change his mind and revert to the Bancroft manoeuvre. This is probably where most operators come to grief. An early decision as to the type of closure is essential. Once having removed the blood vessels from both curvatures of the stomach down past the pylorus, it is too late to change one's mind. It is essential that the vessels on the greater and lesser curvatures be left undisturbed up to the line of section in the pyloric end of the stomach. This line of section may vary to some extent, depending on the degree of induration about the pylorus and first portion of the duodenum, but is usually made 1½" proximal to the pylorus. The actual technique of the procedure may be carried out with two slight variations.

After the mucosa has been separated from the outer coats of the stomach down to the pylorus, it is closed by two overlapping rows of fine catgut suture with or without the use of clamps. The line of incision through the serosa and muscularis may be so planned as to leave only enough of these structures to comfortably cover over the sutureline in the mucosa. The stump is then buried under a convenient bit of omentum. The alternative is to make the line of incision at a more proximal point on the stomach, some two inches from the pylorus, leaving a much wider cuff of muscularis and serosa. If this is done, it will be found necessary to obliterate more dead space between the inner walls of the cuff. Bancroft describes a purse-string for this purpose. We believe this has a tendency to cut off the blood supply to the more proximal portion of the cuff.

There would in this series have been fewer disasters with the Bancroft procedure if it had not in certain instances been used as a last resort on a pylorus denuded of its blood supply, after a vain attempt to mobilize a duodenal ulcer firmly embedded in the pancreas.

The second consideration in assessing the relative merits of various operative procedures is the final functional result. In this series of 280 duodenal ulcers, 93% were followed and their

functional result determined. There was little variation in the percentage of good results between those who had been done by the Bancroft and other methods.

In the Bancroft group, 70 of the 85 were followed and 59 were classified as good results (84.2%), 10 admitted improvement, and one felt that his symptoms were as troublesome or more so than before his operation. In none of this group was there clinical evidence of recurrent ulceration at the stoma.

TABLE III.

FOLLOW-UP GASTRIC TEST MEALS		
No. of follow-ups.....	194	76.0%
Free acid all types exclusive of Bancroft procedures.....	16	7.3%
Free acid in Bancroft procedures.....	12	15.5%
Total showing free acid.....	28	9.5%

The total number of cases which were shown to have free acid in the whole series was 9.5% with an average of 20 units. A somewhat higher percentage of Bancroft cases showed the presence of acid than those which had a complete excision but, as already noted, this has not been reflected by ulceration at the stoma.

Certainly in any clinic where young surgeons are being trained, the operation of prepyloric resection should be one of the procedures demonstrated as a reasonably safe and effective means of dealing with large and difficult penetrating duodenal ulcers. It is believed that the average general surgeon, having been introduced to this method, when dealing with the difficult case, particularly if he has been taught to identify the difficulties in time, will be able to operate with less risk and with as good hope of effective therapy as if he chooses the alternative method of complete extirpation of the ulcer in 100% of cases.

REFERENCES

1. VON EISELSBERG: Billroth in Wolfier's report of his work, Vienna, 1881.
2. FINSTERER, H.: *Zentralbl. f. Chir.*, 45: 434, 1918.
3. DEVINE, H. E.: *Surg., Gynec. & Obst.*, 47: 239, 1938.
4. BANCROFT, F. W.: *Am. J. Surg.*, 16: 223, 1932.
5. HINTON, J. W.: *Ann. Surg.*, 117: 498, 1943.
6. BARTELS, R. N. AND DULIN, J. W.: *Surgery*, 21: 496, 1947.
7. REINHOF, W. F. JR.: *Ann. Surg.*, 121: 583, 1945.
8. STEINBERG, M. E.: *Surg., Gynec. & Obst.*, 84: 1029, 1947.
9. ALLEN, A. W.: *South. M. J.*, 36: 368, 1943.
10. MARSHALL, S. F. AND GERBER, M. L.: *Gastroenterology*, 10: 377, 1948.
11. GARLOCK, J. H. AND LYONS, A. S.: *Surgery*, 25: 352, 1949.
12. LAHEY, F. H.: *New England J. Med.*, 234: 809, 1946.
13. *Idem*: *S. Clin. North America*, 32: 817, 1952.
14. MILLER, G. G. AND RIPSTEIN, C. E.: *Surg., Gynec. & Obst.*, 89: 464, 1949.

PALLIATIVE TREATMENT OF PROLAPSE OF THE UTERUS

SOLOMON GOLD, M.D., *Montreal*

THERE ARE VARIOUS DEGREES of prolapse of the uterus. In the mild form, the condition is hardly apparent and can be ascertained only after careful investigation. In the very advanced case, the prolapse may have progressed to a state where the entire organ with its appendages protrudes through the introitus of the vagina (complete procidentia).

Prolapse of the uterus is usually the result of obstetrical injuries in association with retroversion. This condition is often aggravated after the menopause when there is a loss of tonus of the pelvic viscera.

Although there is an individual equation regarding the complaints in prolapse, there is usually a constant relationship between the degree of prolapse and the symptomatology. Pelvic

pressure, central low lumbar or sacral backache, urinary and bowel disturbances, often associated with nervous and constitutional symptoms, are among the common complaints. The bladder symptoms are often the most distressing. When the bladder base comes to lie on a lower level than its neck, emptying of the bladder does not take place, and there is always some residual urine. This condition gives rise to cystitis of varying severity, frequency of urination, dysuria and even anuria.

In complete procidentia there is, in addition to the above-mentioned symptoms, the discomfort of a mass protruding through the introitus of vagina, a condition which may even incapacitate the patient from walking. Here, owing to circulatory disturbances, the uterus becomes congested, flabby and hypertrophied. The exposed mucous membrane assumes the character of epidermis, and decubitus ulcers are commonly found on the cervical lips and the vaginal wall.

TREATMENT

Where there is no gross contraindication, surgery offers a cure in a great number of cases, and will assure some relief in almost all cases. However, where surgery is refused or is dangerous, one may have to resort to palliative treatment. This consists mainly in mechanical devices to support the uterus which reduce somewhat the cystocele and rectocele, usually found in association with the descent of the uterus. The hard rubber pessaries or the soft rubber doughnut type are commonly employed. By sustaining the vault of the vagina and by stretching out the vaginal walls whilst exerting counterpressure on the columns of the pubic arch, a certain amount of relief is afforded.

However, there are some objectionable features connected with the use of these types of pessaries. The hard rubber pessary is prone to cause pressure-ulcers since the counter pressure of the pessary is exerted on two limited areas, *i.e.*, the posterior fornix of the vagina, and the mucosa over the pubic arch. The soft rubber doughnut type, although less prone to cause pressure-damage to the vaginal mucosa, becomes foul very quickly and requires frequent removal and cleansing. The greatest objection to the use of these types of pessaries, however, is the fact that where support is mostly needed, they fail. Where there has been too much stretching of the vaginal wall, these pessaries tend to roll out with the folds of the vagina.

The cup-pessary fitted with a stem and harness has often been used in such cases. This type of pessary will accomplish the purpose of reducing the hernia, but is very uncomfortable, and often causes ulceration.

THE RUBBER BULB

Five elderly women in the late menopause, with complete procidentia, where surgery was contraindicated, were treated by inserting a rubber bulb, (Asepto syringe bulb B.D., or similar), into the vagina.

The patient is put in the lithotomy position. The uterus is replaced. The proper size bulb is selected. The upper half of the bulb is lubricated. The bulb is compressed with the index finger, folded lengthwise, inserted high up in the vagina, and allowed to open up by releasing the pressure of the finger—the neck of the bulb pointing towards the opening of the vagina. Thus, the slack of the vagina is taken up all

round and the pressure widely distributed. The bulb is found to support the whole vaginal vault, pushing the bladder upward somewhat anteriorly and resting cushion-like, on the pubic arch and on what is left of the perineum. The patient is asked to bear down, and if the bulb is pushed out by strenuous straining, one of a larger size is inserted.

Daily cleansing douches are advised, even though very little of the vaginal mucosa can be reached by the douching fluid. It is preferable to remove the bulb every two weeks, wash it, and reinsert it (although some of my patients have kept it in for over a month without any apparent ill effects.) To remove the bulb, one may lubricate the outlet of the vagina, compress the bulb with the index finger to reduce its volume, and slide it out.

After some months of using this support, it may be found that the introitus of the vagina has become smaller and one has to resort to a smaller sized bulb; otherwise it may become progressively more difficult to insert, or to remove the same sized bulb. It was also found that after using this type of support for a few months there was a definite improvement in the tonus of the pelvic floor, and the uterus was found at a higher level and was better supported than previous to the treatment.

Two patients who have been under this treatment for over a year, for complete procidentia, have been able to walk around in comparative comfort, without any support for a few days, and only on their insistence, for fear that the mass may come down again, was I persuaded to reinsert it. There was, however, one patient where the treatment was not altogether satisfactory. Here, the whole of the uterus and its appendages were completely outside the vagina, and there was no perineum. A large size bulb (Asepto syringe bulb—marked 4 ounces, 9½" in circumference) was used and served the purpose well for walking and the ordinary daily activities. However, when straining at stool in the sitting position, the bulb was pushed out, but the patient soon discovered that by supporting the neck of the bulb with her finger on such occasions, she prevented the bulb from coming out.

There has been a general improvement in all the five cases treated, especially in their emotional state. All the patients were put on urinary disinfectants for a few weeks after treatment was instituted. Three had been suffering from

incontinence besides the usual frequency and dysuria. Two of the three soon became free of the incontinence, and one would "get wet" only after violent coughing or sneezing. In one very debilitated patient, where an intractable case of trichomonas vaginalis was encountered, it was found necessary to remove the bulb for cleansing and deodorizing, once a week. Lubricating the bulb with sulfa ointment before inserting it was found somewhat beneficial.

Soaking the bulb in zonite solution for a few hours will deodorize the bulb appreciably (one teaspoon to a glass of water). Since the bulb is not very expensive, it may be more practical to change it often.

FIVE YEAR SURVEY OF MULTIPLE PREGNANCIES*

RODERICK C. ROSS, M.D. and
NEWELL W. PHILPOTT, M.D., *Montreal*

LITERATURE on the subject of multiple pregnancy has not been extensive. Notice of this fact and stimulation by some recent articles on the subject has prompted a series review from our department. Our bibliography does not list all the articles reviewed during the preparation of this paper, but only those which deal specifically with various aspects treated here.

This study covers all the multiple pregnancies which occurred in this hospital during five years, 1947 to 1951. During this period there was a total of 15,318 deliveries, of which 183 were twin pregnancies (an incidence of 1 in 83) and one was a triplet pregnancy. The percentage incidence of multiple pregnancy was 1.2.

Of these 184 mothers, 55 (29.9%) were primiparæ, and 129 (70.1%) were multiparæ. The average age for primiparæ was 26.4 years, while that for multiparæ was 30.5 years.

A previous multiple pregnancy had occurred in 3 cases or 2.3% of the multiparæ. Two of these cases had had one previous full term delivery and the third had had seven previous full term deliveries.

The average length of labour among the multiparæ was 8 hours, 18 minutes, there being no

SUMMARY

1. The rubber bulb has been found quite satisfactory in the palliative treatment of pro-cidentia of the uterus.

2. An improvement in the tonus of the supporting structures of the uterus was found after some months of using the rubber bulb.

3. No damage to the vaginal mucous membrane was encountered after prolonged use of the rubber bulb support.

4. This type of treatment may be found of value preoperatively, to allow the uterine supporting structures to contract.

REFERENCE

1. DAVIS, C. H.: *Gynæcology and Obstetrics*, Prior, Hagerstown, 1944.

cases of prolonged labour. Among the primiparæ, however, there were four cases of prolonged labour (48 hours or longer), the average duration of the remainder being 12 hours, 42 minutes.

The fetal birth weights seemed to show a slight tendency to greater maturity among the multiparæ where the average weight was 2,445.1 gm. as compared with 2,365.9 gm. for the primi-

THE FETAL PRESENTATIONS IN THE TWIN VAGINAL DELIVERIES WERE AS FOLLOWS

	Primiparæ %	Multiparæ %
Both vertex	34.5	37.1
1st vertex, 2nd breech	30.9	33.1
1st breech, 2nd vertex	5.5	12.4
Both breeches	14.5	7.4
Compound (1 or more)	10.9	4.1
Brow (1st or 2nd)	1.7	2.5
Face	1.7	0.0
Transverse lie (2nd)	0.0	2.4
Miscellaneous	0.0	0.8
		(1st—face, + prolapsed cord, 2nd— breech)

parous births. Our percentage prematurity expresses the number of deliveries in which one or more of the infants weighed less than 2,500 gm. The total percentage prematurity was 65.6, that for primiparæ being 70.6 and for multiparæ, 63.6. If we can assume that the limit of distensibility of the gravid uterus is an important factor in the causation of the onset of labour, might we then, from this 7% difference conclude that the multi-

*From the Department of Obstetrics and Gynæcology, McGill University, Montreal.

parous uterus is capable of accommodating a larger conceptus? Without attempting a definite proof of this point, this is interposed as an interesting speculation.

Primiparæ are compared with multiparæ and certain differences are noteworthy:

1. Double breech presentation was twice as common in primiparæ.

2. Compound presentation was over twice as common in primiparæ, but we feel this is in large part a function of the greater incidence of *early* prematurity, and most of the cases seemed to occur in the 28th to 32nd week period of gestation.

3. Transverse lie occurred in only two cases of multiparæ and both were in the second twin, one having its first infant present as a vertex, the other as a breech.

4. Cases in which the first infant was a breech and the second a vertex, were over twice as common among the multiparæ.

Fetal loss includes only those deaths which occurred antepartum, intrapartum and during the usual eight-day postpartum stay. Of the 184 deliveries, there were 24 or 13% in which fetal loss occurred. In 14 of the 24 (58.4%) both babies died. In 10 of the 24 (41.6%) one of the babies died. In 6 of these 10 (60%) the second child perished while in the remaining 4 (40%), the first child perished. This would, to superficial examination, indicate a greater danger to the second twin, but this will be discussed later on. It will be seen from what has been said that there were 369 fetuses of which 38 died. This gives a total fetal loss of 10.4%. This figure compares with that of Bender's, whose series of 472 cases gave a fetal loss of 11%, and is one of the best figures recorded.

CAUSES OF FETAL MORTALITY

1. *Prematurity*.—The official final diagnosis, with or without autopsy, was prematurity in 21 of the 24 deliveries, giving a percentage of 87.5.

2. *Without prematurity*.—Of the remaining 3 deliveries, or 12.5%, none of the deaths were due to prematurity, and none of the deaths indicated any increased danger to the second twin, as will be seen.

- (a) First baby died from trauma; difficult, prolonged, failed forceps and conversion from L.F.A. to L.M.A. position.
- (b) First baby deadborn and macerated, cause unknown; weight 3,500 gm., full term delivery.
- (c) First was a fetus papyraceus; full term delivery, second baby weighed 3,760 gm.

The associated factors will now be outlined.

ASSOCIATED FACTORS:

(a) With Cæsarean section. There was one death where repeat section was performed for cephalo-pelvic disproportion. The second baby died, weighing only 1,500 gm.

(b) Congenital anomalies. In the entire series, only two were found, the first a cleft palate, the second an ectopic pelvic kidney. These both died of prematurity, respectively weighing 1,450 and 960 gm.

(c) Toxæmia. This condition was present in four cases, but death was officially ascribed in all to prematurity. In two cases, both babies died, their respective weights being 1,900 gm. and 2,400 gm., and 1,245 gm. and 1,270 gm. In the other two cases, the second baby died, their respective weights being 1,270 gm., and 1,500 gm.

This series shows that fetal loss in 87.5% of the deliveries was due to prematurity. In no case was there any other factor which made vaginal delivery or Cæsarean section more hazardous for the second baby.

With these conclusions in mind, the methods used for vaginal delivery of the second twin should be reviewed. In this series, the second twin was delivered spontaneously 94 times, and 89 times by operative and/or manipulative means. The breakdown of these operative procedures is as follows:

Low forceps	24 times
Mid forceps	15 times
High forceps	3 times
Breech extraction	17 times
Piper forceps	10 times
Version and extraction	16 times
Version and extraction and Piper forceps	4 times

Cæsarean section was performed 9 times or 1 in 20.4 deliveries. For the same period, Cæsarean section was performed 710 times in the 15,134 single pregnancy deliveries or 1 in 21.3. These two incidences are similar. Five were repeat sections, in four cases the first having been done for cephalo-pelvic disproportion, and the fifth for abnormal fetal lie.

The following indications were respectively employed in the remaining four cases: (1) Mild toxæmia, slight disproportion and a previous difficult labour in a Para 2. (2) Myomectomy performed four months before pregnancy began in

a Para 1. (3) Marginal placenta prævia in a Para 2. (4) Central placenta prævia in a Para 1. None of these sections was performed for any indication that might stem from a multiple pregnancy *per se*.

For the purpose of this study, *toxæmia* was diagnosed if the minimum requirement of a blood pressure of 140/90 was fulfilled. In this series, there were 30 cases showing an incidence of 1 in 6.1. Two of these 30 cases were eclamptic, 1 antepartum and 1 postpartum. For the same period, the single pregnancies gave an incidence of 1 in 42.7. Consequently, *toxæmia* occurred 7 times more frequently in the multiple pregnancies. Our ratio would seem high since recent British literature indicates *toxæmia* to be about 4 times as common in multiple pregnancies while American figures hold it to be around 3 times as common.

Accidental hæmorrhage occurred only once, giving a 1 in 184 incidence. The patient was primiparous, non-toxic and delivered vaginally. Of the 15,134 single pregnancies there were 113 cases of accidental hæmorrhage (101 non-toxic, 12 toxic) producing a 1 in 133.9 incidence. In the present series, this phenomenon did not show an increased frequency.

Placenta prævia was found in 3 cases, giving an incidence of 1 in 63.3. These cases were as follows: (1) Para 6, partial prævia, delivered vaginally, 4 to 5 hour labour, 400 c.c. blood loss. (2) Para 1, mild pre-eclamptic, complete prævia, delivered by Cæsarean section. (3) Para 2, partial prævia, delivered by Cæsarean section. The single pregnancies for the period showed a placenta prævia incidence of 1 in 151.3, which made this phenomenon 2.4 times as common in multiple pregnancies.

Post partum hæmorrhage was diagnosed if delivery was accompanied by a blood loss of 500 c.c. or more. This occurred 18 times in this series, giving a 1 in 10.2 incidence compared with a 1 in 38.7 incidence for single pregnancies. This condition was nearly 4 times as common at time of multiple birth.

Manual removal of the placenta was performed 6 times producing an incidence of 1 in 30.6. This was done nearly 2 times as frequently as in the single pregnancies, whose incidence was 1 in 58.8.

Some account of the single triplet pregnancy should be given. The patient was aged 41, and this, her third full term pregnancy was attended

by no sign of *toxæmia*. By dates she had reached the 39th week of gestation, and the membranes ruptured 8 days before the onset of labour. The first child, a girl weighing 2,710 gm., delivered spontaneously, vertex L.O.A. The second, a boy weighing 2,280 gm., was delivered by version and extraction since it presented vertex R.O.A. with a prolapsed arm. The third, a girl whose weight was not recorded, but who was of full term size, presented as a breech, and was delivered by breech extraction. The placenta separated completely and spontaneously, and there was no post partum hæmorrhage. All three infants were discharged from hospital alive and well.

SUMMARY

1. Twin pregnancy does not appear to be a significant cause of prolonged labour.

2. The different types of fetal presentation varies somewhat between primiparæ and multiparæ.

3. Efforts to reduce the fetal mortality of approximately 10% in multiple pregnancies should be directed mainly at preventing the premature onset of labour. Several authors suggest that the best way to effect this is the admission of all multiple pregnancy patients to hospital for bed-rest around the beginning of the ninth month.

4. The series indicated no increased danger for the second twin in vaginal delivery in the absence of prematurity.

5. Various conditions were associated with multiple pregnancy: (a) *Toxæmia* was 7 times more common. (b) *Placenta prævia* was over twice as frequent. (c) Post partum hæmorrhage was nearly 4 times more common. (d) The placenta was removed manually twice as frequently as in single pregnancies.

BIBLIOGRAPHY

1. BENDER, S.: *J. Obst. & Gynec. Brit. Emp.*, 59: 511, 1952.
2. RECORD, R. G., GIBSON, J. R. AND McKEOWN, T.: *J. Obst. & Gynec. Brit. Emp.*, 59: 471, 1952.
3. HAWKER, W. D. AND ALLEN, M.: *Am. J. Obst. & Gynec.*, 57: 997, 1949.
4. MUNNELL, E. W. AND TAYLOR, H. C.: *Am. J. Obst. & Gynec.*, 52: 588, 1946.
5. POTTER, E. L. AND CRUNDEN, A. B.: *Am. J. Obst. & Gynec.*, 42: 870, 1941.
6. POTTER, E. L. (& FULLER, H.): *Am. J. Obst. & Gynec.*, 58: 139, 1949.

"The major part of the good physician's wisdom is learned from a wise teacher. It is not taught by lectures but rather by example, and is an accumulation of experiences and reactions to experiences strongly coloured by his teachers."—(Watson, E. H.: *J. Med. Education*, 28: 11, 1953.)

INTRAVENOUS ALCOHOL IN
OBSTETRICAL LABOUR*HILARY B. BOURNE, M.D.,
RODERICK C. ROSS, M.D. and
NEWELL W. PHILPOTT, M.D., *Montreal*

WHILE A GREAT DEAL has been written on intravenous ethyl alcohol in the surgical post-operative patient, there is practically no information regarding its use in obstetrical labour for the alleviation of fear and pain. Indeed, Chapman has been the only one to make a report of his clinical experiments in this regard.

Ethyl alcohol is one of the oldest of drugs and, before the advent of modern anaesthesia, it was the only drug known to have the property of producing analgesia, amnesia, and even anaesthesia, if sufficiently large doses were employed; but, under such circumstances doses approaching the lethal level had to be given. It is no wonder then that alcohol as an analgesic and anaesthetic agent was forgotten quickly when modern anaesthesia was born. Indeed, it was not until 1920 that Behan, while treating patients with septicæmia by injecting dilute alcohol into their veins, observed that they promptly became quieter and went peacefully to sleep. Accordingly, he tried this form of analgesia in the post-operative patient and found that the need for morphine and the like was seldom necessary.

It has become increasingly clear during the last 10 years that alcohol is not only a safe, potent analgesic and sedative agent but also an excellent source of calories and energy in the severely debilitated and weakened patient. Moreover, postoperative complications, notably nausea, vomiting, ileus and pulmonary complications, are encountered less frequently. All of these beneficial features can be explained pharmacologically.

In the obstetrical patient during labour intravenous ethyl alcohol has distinct advantages: (1) It is a safe drug when used in clinical dosage and, because of its rapid utilization and elimination, it can be readily controlled; (2) it has no adverse effects on the cardiovascular system; (3) the healthy kidney is not influenced adversely; (4) liver function is not interfered with in the healthy patient; (5) respiration is stimulated and not depressed as is the case with other forms of analgesic and seda-

tive agents; (6) it provides calories and energy and has a "sparing" effect on liver glycogen; and (7) it affords hydration and sedation at the same time.

The contraindications are few and perhaps not clearly known, but it would seem advisable not to use the drug in: (1) chronic alcoholics; (2) patients with demonstrable liver disease; (3) epileptics; (4) impending or actual shock; (5) cases where past-partum hæmorrhage is anticipated.

It is the safety, potency and lack of respiratory depressant effects not only in the mother but also in the newborn that prompted this clinical evaluation.

METHODS OF STUDY

For this study 100 primiparæ, who were admitted to the hospital in early labour, were chosen. No multiparæ and no primiparæ who were more than 7 cm. dilated were used, since as long a time as possible to evaluate the practicability and effectiveness of this drug during labour was desired.

Four groups of 25 consecutive patients each were used. For the first group Travenol (Baxter), which is 5% alcohol and 5% glucose in water, was used; for the second group Demerol alone was used in order to afford a comparison; for the third group Travamine alcohol (Baxter), which is 7½% alcohol, 5% protein hydrolysate and 5% glucose in water, was employed; and to the fourth group a combination of demerol and Travenol was given.

When Travenol was used 250 to 300 c.c. were given in the first 20 minutes and then the rate of flow adjusted according to the response of the patient, usually about 60 to 80 drops per minute. Demerol was employed in 100 mgm. doses and was repeated not oftener than every 4 hours and only when indicated. Travamine alcohol was administered in the same fashion as Travenol except that only 150 c.c. were given in the first 20 minutes and the rate of drip thereafter was necessarily regulated at a slower rate of speed.

With the last group of cases demerol in 50 mgm. dosage was given at the same time that the Travenol was started. In this group about 200 c.c. of Travenol were given in the first 20 minutes and the subsequent drip regulated at a slower pace.

The alcohol solutions were repeated in cases in which labour was prolonged and sedation was

*From the Department of Obstetrics and Gynaecology, Royal Victoria Hospital, Montreal.

required. As many as 3 bottles were used in one case over a period of 2 days. In most instances, however, no more than 1,000 c.c. were necessary. No patient was delivered without some anaesthetic agent which was usually of the gaseous inhalation type, a few spinals being used for obstetric or medical reasons, and a few local infiltrations of novocaine being employed for breech deliveries. At the end of each confinement the length of labour from its onset to the beginning of the 3rd stage was calculated and recorded. The same was done for the third stage of labour and the estimated blood loss was also noted. The condition of the baby was observed and recorded.

Finally, an evaluation of the effectiveness of the sedative agent used was attempted and recorded; this was purely a clinical assessment, and was estimated empirically. For purposes of convenience the effect of sedation was regarded as "good", "fair" and "poor". A "good" result was one in which the patient became drowsy and quiet, slept between contractions and obtained obvious reduction in pain during a contraction. A "fair" effect was one in which the patient became relaxed between contractions and rested, but had no appreciable reduction in intensity of pain. A "poor" result was one in which no real effect could be ascertained.

CLINICAL FINDINGS

Travenol.—Travenol (5% alcohol) was the first alcohol solution used and was administered to the patient intravenously as soon as sedation was required. It was soon discovered, however, that, if the alcohol was given too early or before labour was well established, there was a tendency to a reduction in the frequency and duration of the uterine contractions. The expulsive forces of the uterus therefore became less efficient and progress was impeded. Accordingly, the patient was allowed to carry on without sedation until there was no doubt as to the establishment of labour and until the cervix had reached 4 to 5 cm. of dilation.

Fifteen of the 25 patients, whose ages ranged from 16 to 34 years, obtained a fair to good effect, the remainder being indifferent or poor. In no case was the infusion given to the point of retarding the progress of labour, at least perceptibly, and this is probably responsible for the lack of more success as far as analgesia and amnesia are concerned. No patient became inebri-

ated and only the occasional one was euphoric. The tolerance of the individual patient was variable and necessitated frequent adjustment of the rate of infusion. Vomiting did occur occasionally but was not a bothersome feature and in most instances did not appear to be the result of the alcohol. All babies cried spontaneously at birth and were active; only one baby was sleepy and required frequent mild stimulation. In all cases except one a gaseous anaesthetic was employed.

The average length of labour from its onset to the beginning of the third stage was 22 hours 28 minutes, the shortest labour was 5 hours, the longest 54 hours 47 minutes. The average length of the third stage 9.2 minutes; and the average blood loss 264 c.c.

Demerol.—The effects of Demerol were not as good as with Travenol. Only 10 of the 25 patients exhibited fair to good sedation and analgesia, the remainder obtaining little if any benefit from the drug. Repeated doses were given when necessary and if delivery was not near at hand. If given too early in labour, a reduction in the frequency and duration of the uterine contractions occurred as with the Travenol. Vomiting occurred in several cases but was only transitory. Of the babies 6 were sleepy at birth and one required resuscitation in the form of tubbing for a few minutes; in most of these cases, Demerol had been administered within an hour or two before delivery and in all of them a gaseous anaesthetic was employed.

The average length of labour from its onset to the beginning of the third stage was 19 hours 18 minutes; the shortest labour was 3 hours 47 minutes, the longest 40 hours 48 minutes. The average length of the third stage was 9.4 minutes and the average blood loss was 332 c.c.

Travamine alcohol.—The results obtained with Travamine alcohol were satisfactory in so far as sedation and analgesia were concerned. Seventeen of the 25 patients, with ages ranging from 17 to 31 years, showed a response that was regarded as fair or good, the remaining 8 patients revealing little or no benefit from the drug. The striking feature about this alcoholic solution (7½%) was its tendency to decrease the frequency and duration of the uterine contractions. Indeed, a smaller quality by weight of alcohol in Travamine-alcohol as compared with Travenol was noticeably more potent in this respect, a feature which is difficult to explain. This preparation was accordingly much more difficult to

regulate and its practical usefulness therefore questioned.

Of the babies 4 appeared sleepy at birth and 2 required some resuscitation; the mother of one of the sleepy babies had been given Demerol by mistake a short while before delivery which may have had something to do with it. Why 2 babies required resuscitation was not apparent but they did well afterwards. A gaseous anaesthetic was used in all cases, except one for which a spinal was given.

The average length of labour from its onset to be beginning of the third stage was calculated to be 25 hours 48 minutes. The average length of the third stage was 11.5 minutes. The average estimated blood loss was 421 c.c., there being two postpartum hæmorrhages of 1,000 c.c. and over and three of 500 c.c. and over.

given and 3 local infiltrations employed; the remaining 16 patients received a gaseous anaesthetic.

The average length of labour to the end of the second stage was 19 hours 58 minutes. The average length of the third stage was 6.7 minutes and the average blood loss 352 c.c.

DISCUSSION

An investigation of this nature lends itself to clinical observations and impressions only, but the data compiled in the accompanying table reveal a couple of apparent tendencies. In comparing the effects of sedation of the various agents used, it is apparent that Demerol when used alone yielded the poorest results, whereas Demerol plus Travenol (5% solution) seemed to give the best results. Thus it is that with Dem-

TABLE I.

INTRAVENOUS ALCOHOL IN LABOUR													
Sedative	Effects of sedation			Baby at birth			Anæsthetic agents			Length of 1st & 2nd stages		Length of 3rd stage	Blood loss
	Good	Fair	Poor	Active	Sleepy	Resus'd	Spinal	Local	Gas	Hrs.	Mins.	Mins.	c.c.
Travenol (5% alcohol)	5	10	10	24	1	0	1	0	24	22	28	9.2	264
Demerol	2	8	15	18	6	1	3	1	21	19	18	9.4	332
Travamine (7½% alcohol)	4	13	8	19	4	2	1	0	24	25	48	11.5	421
Demerol plus Travenol	13	5	7	23	2	0	6	3	16	19	58	6.7	352

An interesting finding was the urinary specific gravity which in more than one case was found to be as high as 1.042. This feature was not investigated biochemically and was probably the result of increased amounts of amino acids in the urine.

Demerol and Travenol.—The combination of Demerol and Travenol (5% alcohol) gave the best results. 18 of the 25 cases obtained a fair or good response, the remaining 7 showing no effect. In the occasional case labour was retarded slightly in its progress but was never stopped. The ages ranged from 16 years to 29 years. Vomiting was not a noticeable feature and in no case did inebriation occur. Occasionally the Demerol was repeated as was the alcoholic preparation.

Two of the babies were sleepy at birth and required only mild stimulation. 6 spinals were

erol alone only 2 patients received "good" relief while Demerol plus Travenol produced 13 "goods". At the same time it will be noticed that Travenol and Travamine yielded 5 and 4 "goods" respectively. These findings indicate the sedative quality and potency of alcohol and its apparent superiority over Demerol.

Another interesting observation which was made clinically and which the table substantiates was that pertaining to the length of labour. In some cases labour was definitely retarded and even stopped, especially the labours which were not of the strong, steadily progressive type. Cessation of the infusion, however, soon led to the resumption of uterine contractions. The table also reveals that the labours of shortest duration were associated with the use of Demerol alone while the longest labours were associated with Travamine. Indeed, there was a difference of

more than 6 hours, and one therefore questions the use of higher concentrations of alcohol, except when one wishes the dual effect of rest and rehydration at the same time.

In our series there was no maternal mortality and all of the babies were born alive and did well. There were several breech deliveries among the hundred patients and a few babies were premature and small. The usual number of occiput posterior position were encountered and as expected led to the greatest discomfort and lack of more success with the alcohol. Moreover, it was in the occiput posterior positions that the problem of inertia was bothersome, so that either no relief of pain was effected or labour was stopped.

The disadvantages of intravenous alcohol in labour are those of any intravenous infusion. Whenever possible a vein in the forearm should be used in order to afford complete freedom of movement of the wrists and elbows. A plastic infusion set with a short adapter and flexible tubing is ideal for this purpose, and reduces the likelihood of infiltration. An average number of infiltrations occurred in the series but in none was there any untoward effects. No reactions were encountered.

Perhaps the greatest disadvantage in the use of intravenous alcohol is the careful watch that must be kept on the rate of infusion and the depth of narcosis in the patient, but this is probably one of the important advantages from the patient's standpoint. Nausea and vomiting were not noticeable or bothersome, and after effects were nil. The so-called "hang over", a common sequel to liberal oral intake is apparently an infrequent occurrence, and Chapman reported that none of his series experienced it.

The placenta offers no barrier of defense for the fetus as Chapman has shown. He determined the blood alcohol levels of the maternal and cord bloods at the time of delivery in 10 cases. In the mother, the average was 0.068% and in the newborns it was 0.042%. This is an interesting finding and substantiates the fact that the lack of respiratory depression in the babies, regardless of the state of inebriety in the mother, was not due to lack of alcohol in the fetal circulation. Moreover, it also reaffirms a previous statement, namely, that alcohol is not a respiratory depressant when used in clinical dosage.

From our clinical findings we feel that alcohol as a sedative and analgesic agent in obstetrics

deserves a definite place among the many drugs already used for this purpose particularly in patients who require supportive fluid and caloric therapy at the same time. Intravenous alcohol plus small doses of intramuscular Demerol yielded the most gratifying results.

SUMMARY

1. A review of some of the physiological and pharmacological effects of alcohol has been made.

2. A series of 100 primiparæ is presented in whom 5% and 7½% alcohol solutions mixed with glucose and protein hydrolysate was used as an analgesic agent, either alone or in conjunction with intramuscular Demerol.

3. Intravenous alcohol either alone or with small doses of Demerol gave better results than Demerol alone.

4. No maternal or fetal deaths occurred in this series.

5. Patients with occiput posterior positions seemed to obtain little or no relief from intravenous alcohol, and its use in inertia types of labours is questioned.

6. There is a definite tendency to reduce the frequency and effectiveness of uterine contractions particularly with the higher concentration of alcohol.

7. The fluid value of the solutions used is indicated.

8. The disadvantages are few and are negligible in comparison with the advantages.

9. The best results in our series were obtained when 5% alcohol and 50 mgm. Demerol were used simultaneously.

10. Intravenous alcohol seems to be a safe and potent analgesic agent in obstetrics, and has no apparent adverse effect upon the fetus.

We wish to express our gratitude to the Baxter Laboratories who supplied the materials necessary for this study.

BIBLIOGRAPHY

1. CHAPMAN, E. R. AND WILLIAMS, P. T. JR.: *Am. J. Obst. & Gynec.*, 61: 676, 1951.
2. BEHAN, R. J.: *Am. J. Surg.*, 69: 227, 1945.
3. GOODMAN, L. AND GILMAN, A.: *The Pharmacological Basis of Therapeutics*, Macmillan, New York, 1941.

Knowledge and wisdom, far from being one,
Have oft-times no connexion. Knowledge dwells
In heads replete with thoughts of other men;
Wisdom in minds attentive to their own.
Knowledge is proud that he has learned so much;
Wisdom is humble that he knows no more.

—COWPER

RECTAL TRIBROM-ETHANOL (AVERTIN, BROMETHOL) IN ECLAMPTIC TOXÆMIA

W. DOUGLAS FREW, M.B.Ch.B.,
F.R.C.S.[C], D.R.C.O.G., *Edmonton*

FEW COMMUNICATIONS on the use of tribrom-ethanol in the management of eclamptic toxæmia have appeared in the literature, the two outstanding recent reports being those of Dewar and Morris (1947) and of Kellar (1950). There have been none, as yet, from Canada.

This paper is intended as a practical presentation of the use and advantages of the drug, most particularly in that type of emergency where the patient—seized or threatened with convulsions—has to be transported to hospital from a distance. This is a predicament not infrequently met with in Western Canada where the journey to hospital is often made by air ambulance or snowmobile with, in every case, a time-lag before the patient is seen by a specialist and before adequate institutional therapy can be initiated. This time-lag is a harassing period for all, the patient being in a precarious position and her attendants justifiably apprehensive of additional convulsions developing en route.

For such situations in particular but also for other cases of severe pre-eclampsia and eclampsia an ideal sedative and anti-convulsant has been found in tribrom-ethanol given as first described for any large series of cases by Dewar and Morris in 1947. This drug is easily prepared, simple to give and has proved itself both effective and safe. It can be made ready for rectal injection in a matter of minutes and, where not required instantly, may be stored in a thermos flask or transported therein to any outlying district where it might not be available. The patient is quickly under control, remains so for adequate periods without further sedation, may be moved to hospital without danger of convulsions and is received in such condition that any necessary examination or minor obstetrical procedure may be carried out without added sedation or anaesthesia. Further, tribrom-ethanol has shown no undesirable side-effects and has been demonstrated to have certain advantages over other better known methods of protection.

Because of its availability and ease of administration, morphine has remained the most popular of the many sedatives from our thera-

peutic armamentarium which have been used in the attempted control of eclamptic convulsions. Popularity however, should not blind us to possible dangers and, apart from their well known depressor effect on respiration, it is now known that heavy sedation with many narcotics—morphine included—will reduce urinary excretion and, thus, may well be the cause of converting an oliguric toxæmia into an anuric death. In a study of the anti-diuretic effect of the depressant drugs used in eclampsia, Brown, Hodges and Bradbury (1950) showed that morphine and other narcotic drugs produced a considerable depression of urine volume whilst Avertin, in comparable doses, actually increased the volume, a diuresis not found with other sedatives. While this diuretic response to Avertin has not, as yet, been proved clinically with eclamptic patients it is my impression, shared by Dewar, that it does exist, and at least it is known that Avertin is not anti-diuretic; since upwards of 20% of deaths in eclampsia are directly attributable to oliguria and anuria it is rational to advocate the use of a sedative which is known not to aggravate these lethal factors.

ADMINISTRATION

As supplied by the makers under the better known trade-names of Avertin and Bromethol, each millilitre of the drug contains one gram of tribrom-ethyl-alcohol. Dosage is calculated in relation to the patient's body weight, approximately 0.04 millilitres of the provided solution being used for each pound of weight; in other words, slightly less than the well known dose of "0.1 of a gram per kilo" as used in surgical basal narcosis. The dose is not critical and the maker's weight-dosage charts supplied with each bottle for ease of calculation need not be followed slavishly to decimal exactitude.

It is obvious that, in many cases, the correct weight of the patient will not be known and have to be estimated, but this difficulty can be overcome by preparing and sending out a dose suitable for a woman of 160 pounds which, where necessary, can then be adjusted down by discarding a small amount where the patient is obviously considerably under that weight.

The required amount, calculated as described, is diluted to a 3% solution with water previously warmed to body temperature and, after testing, may be administered immediately by slow rectal drip or, where it has to be sent out in a thermos-

flask, will keep for at least six hours without deterioration.

Results.—Fifteen or twenty minutes after commencement of the drip the patient is sleeping soundly and showing a very welcome fall in blood pressure. She may now be moved to hospital. The ease with which these patients are handled is remarkable; they remain tranquilly asleep even though subjected to noise or bright lights, and do not develop convulsions in spite of the unavoidable manœuvring of the stretcher and journeys which are generally tedious and trying to both patient and attendants. They stand air travel well; I have had cases brought in in mid-winter by ski-plane and snow-mobile and have recently been informed of another case transported more than 200 miles over the sea in

series, and this is also the finding of Dewar, Morris, Kellar and de Soldenhoff in the Old Country and of Miller in the United States, a combined total of over 300 cases.

I do not consider that tribrom-ethanol has any place in the immediate control of convulsions in the late stage of labour where difficulty may be experienced in inserting the rectal catheter against the pressure of the presenting part, and where a quicker acting anæsthetic is indicated to cover the delivery period.

Obstetrical management.—With regard to obstetrical management where tribrom-ethanol has been used, this does not differ from that employed with other types of sedation, it is simply made easier. Time only permits the barest outline but it may be said that, where conditions

TABLE I.

Case No.	Age	Para	Period in weeks	Highest recorded blood pressure	Albumen in gm. per litre	Edema	Convulsions Before Tribrom-ethanol	After	Obstetrical treatment	Mother	Results Child
1	30	2	32	200/130	XX	XXX	0	0	A.R.M.	A	A (2.12)*
2	23	0	41	190/120	8	X	0	0	A.R.M.	A	A (7.3)
3	41	13	26	260+/130	6	XXX	0	0	Hysterotomy	A	Abort.
4	26	0	39	180/130	10	XXXX	2	1	A.R.M.	A	A (8.8)
5	28	0	36	190/100	12	XXX	0	0	A.R.M.	A	S-B (5.8)
6	33	0	38	200/110	16	XX	1	0	A.R.M.	A	A (6.9)
7	26	0	38	200/130	2	Face	1	0	A.R.M.	A	A (7.2)
8	23	1	37	170/120	12	XXX	1	0	A.R.M.	A	A (7.3)
9	37	0	40	200/100	16	XXX	0	0	Section (twins)	A	A (5.11½)
10	30	0	?	175/110	18	XXX	0	0	Spont.	A	A (5.11)
11	26	0	40	180/100	½	XXXX	1	0	Spont.	A	A (5.10½)
12	19	0	26	170/110	13	X	1	0	Hysterotomy	A	Abort.
13	24	0	39	170/110	½	X	2	0	Spont.	A	A (8.4)
14	20	0	25	160/100	16	XXXX	1	0	Hysterotomy	A	Abort.
15	38	0	38	180/110	3½	XX	0	0	Bougie	A	A (5.13)
16	32	0	34	190/120	12	XXX	2	0	A.R.M.	A	S-B (4.0)
17	20	0	42	150/90	1	XX	1	0	Spont.	A	A (8.9)
18	17	0	40	195/130	2½	Face	0	0	Spont.	A	A (7.13)
19	32	0	33	210/124	16	XXXX	0	0	Section	A	A (4.8)
20	15	0	24	230/110	XXXX	XXXX	3	0	Hysterotomy	A	Abort.
21	27	0	32	170/140	XXXX	XXXX	3	0	A.R.M.	A	S-B (5.0)
22	19	0	39	190/125	16	XXX	1	0	Spont.	A	A (7.1)
23	18	0	36	170/140	XXXX	XX	4	0	A.R.M.	A	S-B (5.4)

*Neonatal death on 12th day.

what was described as "shocking weather". None of these cases developed further convulsions.

Frequency of dosage.—Repeat doses are rarely required before three to six hours after the first and, frequently, are not required at all. The recovery should be watched carefully and additional sedation given at once on the warning signs of restlessness with a rising blood pressure. Although these patients are never left alone and unattended, Dewar and Morris have nursed them in the open ward, a signal tribute to the effectiveness of the drug and an additional advantage to its use in small or crowded hospitals where isolation rooms and adequate staff are not always available.

Disadvantages and complications.—There were no complications, immediate or late, maternal or fetal, incident on the use of the drug in my own

and the cervix are ripe, artificial rupture of the membranes is carried out and delivery effected as soon as feasible. Under modern conditions of anæsthesia, supportive therapy and the use of the antibiotics, and where the condition of the cervix precludes delivery from below, I am far from averse to the judicious use of hysterotomy or Cæsarean section for, although conservative management is best at first, when it fails then prompt delivery by the method most likely to be successful is indicated.

CONCLUSIONS AND SUMMARY

Once convulsive eclampsia is threatened or has developed the objectives in treatment are the prevention of further convulsions, the safe transport of the patient to hospital in the shortest possible time, and her arrival there in the best

possible condition for whatever further treatment is considered essential.

Tribrom-ethanol is a valuable aid in management and attains each of these objectives in a fashion unexcelled by any other type of sedation. Table I, illustrates the results achieved in 23 consecutive emergencies amongst which, judged by blood pressure and albuminuria, there is a preponderance of severe cases. Because tribrom-ethanol was used as early as possible in each case, the number of fits before delivery in this series is no criterion of severity but only evidence of the competence of the drug. In these 23 cases, no single case which received adequate

permission of the authors concerned, I have prepared Table II which shows the results from 107 cases similarly managed at the hospitals noted. This number I consider large enough to have statistical significance. Some of the value of these tables is lost without a control series for comparison but, since I am now prepared to rely solely upon tribrom-ethanol for the prevention or control of convulsions, I am unable to provide one myself. For this reason I have prepared Table III which, culled from recent journals, show the results obtained in nearly 700 cases managed with drugs other than tribrom-ethanol. While not suggesting that this is the

TABLE II.

ALL CASES SEDATED WITH TRIBROM-ETHANOL					
Dates	Hospital and author	No. of cases	Fits after sedation	Maternal deaths	Fetal M.R. (uncorrected)
1943-46	Ayrshire and Dumfries. Morris and Dewar	44	3	2	30.6%
1947-50	S.M.M.P. (Ed:)* Kellar	40	0	0	
1948-51	Own series	23	0	0	33.3%
	Totals.....	107	3	2	
	Percentages.....	100	2.8	1.9	

*Quoted in "Modern Trends in Obstetrics and Gynaecology", Butterworth, London (1950); Chapt. 18, p. 291.

TABLE III.

Dates	Hospital and author	No. of cases	Drugs used	Fits after sedation	Mortality rate	
					Maternal	Fetal
1930-49	Cincinnati (Garber <i>et al.</i>)	195	Veratrum and morphine	?	1.5% (3)	—
1940-50	Dublin hospitals	320	Various	55.0% (Est'd.)	13.0% (42)	—
1947-50	Rotunda (Browne)	15	(1) morphine	53.5%	20.0%	20.0%
		18	(2) pentothal	22.2%	5.5%	27.2%
1948-49	Richmond (Va.) (McElrath <i>et al.</i>)	12	Continuous spinal	33.3%	0.0%	33.3%
1948-51	Combined series (Table II.)	107	Tribrom-ethanol	2.8%	1.9%	—

dosage developed a convulsion thereafter and all were transported to hospital without incident. The one case in which a convulsion occurred after administration of tribrom-ethanol (Case No. 4) was one in which at least half of the required dosage was not retained but lost during the ambulance journey into hospital, so that it cannot rightly be said that this patient received adequate dosage. Table I also shows the high blood pressures recorded in which one is accustomed to finding an almost equally uniform and quite sharp fall following tribrom-ethanol sedation.

Maternal mortality in this small series is zero. I admit at once that this is not statistically significant and, for that reason and with the kind

final answer in the treatment of eclampsia, these figures warrant tribrom-ethanol's more general trial and adoption, particularly in the contingencies to which this paper mainly relates.

I am particularly indebted to Drs. R. de Soldenhoff and Gilbert Forsyth of the Ayrshire Central Hospital, Scotland, for their active co-operation in providing much of the material for this paper, and also gratefully acknowledge the helpful criticism and interested advice received from Dr. Bruce Dewar. I would like to express my thanks to Professors W. I. C. Morris and R. W. Kellar, who were kind enough to send me particulars of recent cases of their own treated by this method, and to Professor W. A. Scott, who read the manuscript and tendered helpful advice regarding its format.

In preparing this paper I did not have the advantage of a perusal of the results published by Campbell and Burton in February 1952. These authors reported 36 cases of eclampsia (all convulsive) treated with Avertin without a single maternal death, and with a fetal mor-

ality of 28.95% as against a previous maternal and fetal mortality rate of 16.6 and 39% respectively. They quoted a fit recurrence rate of 25%, but point out that this was largely due to inadequate dosage in the earlier cases treated—as was indicated also by Dewar and Morris in their original paper.

BIBLIOGRAPHY

1. BROWN, W. E., HODGES, R. E. AND BRADBURY, J. T.: *Am. J. Obst. & Gynec.*, 60: 1, 1950.
2. BROWNE, O'D.: *J. Obst. & Gynec. Brit. Emp.*, 57: 573, 1950.
3. CAMPBELL, A. U. AND BURTON, H.: *J. Obst. & Gynec. Brit. Emp.*, 59: 30, 1952.
4. DEWAR, J. B.: Personal communication 1952.
5. DEWAR, J. B. AND MORRIS, W. I. C.: *J. Obst. & Gynec. Brit. Emp.*, 54: 417, 1947.
6. GARBER, S. T., ASSALI, N. S., KISTNER, R. W. AND PRYSTOWSKY, H.: *Am. J. Obst. & Gynec.*, 60: 315, 1950.
7. MILLER, N. F.: *J. Iowa St. Med. Soc.*, 34: 457, 1944.
8. MCELATH, P. J., WARE, H. H., WINN, W. C. AND SCHELIN, E. C.: *Am. J. Obst. & Gynec.*, 58: 1084, 1949.
9. O'DRISCOLL, K. AND QUINN, B.: *J. Obst. & Gynec. Brit. Emp.*, 58: 961, 1951.
10. DE SOLDENHOFF, R.: Pre-eclampsia and Eclampsia in Ayrshire (awaiting publication).

CONCERNING STROKES*

MILLER FISHER, M.D., F.R.C.P.[C.],
Montreal

SEVERAL YEARS ago when Professor Wilder Penfield suggested to me a neuropathological study of the effect of high blood pressure on the brain, I was under the impression that the subject of cerebrovascular disease had already been well cut and dried by the pioneers of Neuropathology. As the study progressed it became apparent that this was far from true, for many aspects of the subject had not yet been investigated and many details lacked clarity. What is more, few laboratories seemed interested in the subject, although as a cause of disability, illness and death, vascular disease of the brain has few rivals. Of more practical importance was the fact that there was no effective treatment for this group of illnesses although the use of sympathetic block in strokes and of arterial ligation for berry aneurysms gave some promise. It seemed that the most logical approach to the therapeutic problem was to carry out a broad clinico-pathologic investigation of cerebrovascular disease and hope that a clear delineation of the pathologic substrate would help to point the way to a more effective therapy.

Before proceeding it should be pointed out that a detailed study of vascular disease of the brain can have a wider significance than merely providing an explanation for strokes, for any patho-physiological rules or principles found to apply within the cerebral vessels should have general application in the rest of the circulation. The brain is unusually sensitive to ischaemia, and a few seconds of interference with blood flow may result in symptoms, whereas in the heart

and limbs no such fine indicator exists, making it difficult to interpret the train of pathological processes from symptoms and signs alone. A careful appraisal of all the properties of atherosclerosis in the cerebral vessels should enable worthwhile conclusions as to the essential mechanism of this most important disorder. Also the cerebral vessels are thin and their territories of distribution are conveniently dispersed and accurately known, making the brain an ideal organ for studying the behaviour and effects of embolic material. From a purely neurological point of view vascular disease produces unique lesions, large and small, of many types, throughout the brain, providing an excellent opportunity to study in humans the localization and nature of cerebral function, particularly as deduced from the deficit following upon such lesions.

The basic pattern of the cerebral circulation is well known to all of you, and only a brief review will be made here. The internal carotid artery dividing into its anterior and middle cerebral branches supplies blood to the lateral and medial aspects of the hemispheres. The posterior cerebral artery, which usually arises from the basilar but which comes from the internal carotid artery in some 12% of cases, supplies the inferior surface of the temporal lobe and the entire occipital lobe. The Circle of Willis is of many patterns providing a variable anastomotic blood flow from one side to the other and from the basilar to the carotid system. In addition to these collateral channels there are many small but potentially effective anastomotic connections over the cortex between the anterior and middle and posterior cerebral arteries and even from one side to the other across the corpus callosum. The cerebellum is supplied from the basilar system by the three cerebellar arteries, there being considerable variation in their pattern.

*From The Montreal General Hospital and the Queen Mary Veterans' Hospital.
Delivered before the Montreal Medico-Chirurgical Society, December 19, 1952.

It is generally the cortical vessels just enumerated which come to mind when conjuring up the pathological picture of the usual stroke, with resultant disregard of vessels of no less importance, namely, the penetrating arteries which run to the basal ganglia from the middle cerebral artery, to the thalamus from the basilar and posterior cerebral arteries, and to the pons and medulla from the basilar and vertebral arteries. These arteries although smaller, supply regions in which tracts and functions are highly concentrated and where lesions may have effects apparently out of proportion to their size. The territory of supply of each of these vessels is strikingly constant and invariable. In contrast to the surface arteries the penetrating arteries are for practical purposes end-arteries, occlusion generally resulting in infarction. Of somewhat the same calibre as the penetrating arteries is the central retinal artery whose branches viewed ophthalmoscopically often occasion profound but unjustified pronouncements concerning the vessels elsewhere in the body. In view of the present day interest in the brain stem and thalamus, it is important to appreciate that the middle cerebral artery usually carries no blood to them, the basilar system performing this function.

Until recent years only the arteries attached to the brain removed at autopsy received methodical study, the main line arteries carrying the blood to the brain, namely the cervical portion of the carotid and vertebral arteries, being for the most part neglected. The carotid part of this blind spot in the pathological study of strokes is being routinely assessed at present and the results to date appear quite significant. The vertebral system has not as yet been sufficiently investigated.

The term "stroke" is still a useful one, although far from clearly defined, and most physicians use it to refer to any neurological event of vascular origin whether brief or prolonged, mild or serious. Apoplexy, with its connotation of being struck down, hardly applies to milder attacks, while the term cerebrovascular accident is undesirable in the legal branch of medicine where accident usually has reference to trauma.

Many different disease entities can result in strokes, but the immediate pathologic substrate usually can be resolved into one or other of the three well known vascular processes; embolism, hæmorrhage and thrombosis. Roughly each of

these types of stroke occurs with about the same frequency, although it will become clear later that strictly speaking there is a fourth group of considerable size in which the nature of the process is assumed rather than known exactly. As regards this relative frequency the high incidence of cerebral embolism is not generally appreciated. Demyelinating diseases of the nervous system particularly multiple sclerosis rarely imitate strokes, acute necrotic encephalomyelopathy being the only type which need be kept in mind. The clinical picture in a stroke is of course highly variable depending upon the type, size, site and speed of progress of the lesion. It must be pointed out that in cases of stroke it is not easy to make an accurate clinical diagnosis of the type or site of the lesion and to be correct only once in five or ten cases is not uncommon. I mention this point to emphasize how difficult it is at present to assess the various types of therapy, especially sympathetic block, for an accurate diagnosis is a prime requisite in understanding the success or failure of any therapeutic measure. Of course, the diagnosis is made easier in some cases by finding blood in the cerebrospinal fluid on lumbar puncture, but most cases of hæmorrhage have passed the point of no return when the fluid is bloody. It is proposed to deal in turn with embolism, hæmorrhage and thrombosis, the last of these to be covered in somewhat greater detail than the others.

CEREBRAL EMBOLISM

The embolic material is usually a piece of thrombus or clot, but occasionally it may consist of a bit of valvular vegetation, air, fat, bone marrow, tumour cells, atheromatous material or parasites. Here, only embolism due to thrombus or blood clot will be considered. Such emboli commonly originate in the appendage of a fibrillating left auricle. Often no trace of a residual clot can be found in the appendage in these cases at autopsy, but microscopic study will reveal mural thrombotic material therein when gross examination is negative. Another common source is mural thrombus deposited on a region of myocardial infarction. Not infrequently in such cases the clinical history does not incriminate the heart, but keeping the possibility in mind along with an electrocardiogram will help to make the diagnosis. Emboli can arise from mural thrombus deposited on athero-

sclerotic ulceration in the ascending aorta or large vessels of the neck. Emboli have been found to originate from thrombus deposited on atherosclerotic ulceration in the carotid sinus and also to arise distal to severe atherosclerotic stenosis within the carotid sinus. It is likely that during the thrombotic occlusion of a cerebral vessel, pieces of clot are sometimes carried distally to produce an embolic lesion.

The vast venous bed of the lungs also can serve as a source of emboli, as is apparent in metastatic abscesses or secondary bronchiogenic carcinoma of the brain. Cerebral emboli arise from pulmonary venous clots postoperatively and at other times too, no doubt, but it is an impossible task to search all the veins of the lungs for residual clot at autopsy. Paradoxical embolism in which blood clot from a systemic vein passes into the systemic arterial system via a patent foramen ovale is one of those medical curiosities which for some reason gain in every physician's memory a niche vastly out of proportion to their significance. The diagnosis is considered only after all other sources have been ruled out and then, if there is a defect in the region of the foramen ovale (25% of cases) the entire systemic venous system has to be checked. Hence, paradoxical embolism is scarcely ever substantiated. At the same time as this rather long list of sources of embolus is given it must be made clear that in many cases, although the diagnosis of cerebral embolism seems beyond question, no source for the embolus can be found after most careful search. This is true at all ages but particularly in the 20 to 40 year group.

Cerebral emboli may be large or small. We possess few exact data regarding the character of emboli (shape, length, consistency, colour, constitution, etc.) as they are carried along in the blood stream. The resulting infarct may involve an entire cerebral hemisphere or be so small that only a few mm. of a convolution are destroyed. Most emboli enter the territory of the middle cerebral artery but any vessel, superficial or deep, in cerebrum, brain stem or cerebellum may be involved. Occasionally a large embolus may break and pieces pass up each carotid system to produce bilateral lesions of the same age. The embolus commonly is halted at the bifurcation of a vessel or at a narrowing due to atherosclerosis. The blood flow is probably arrested rather abruptly with the result that

collateral flow from other territories does not have time to compensate and all the tissues supplied by the affected vessel become infarcted, *i.e.*, the infarct conforms quite exactly to the entire territory distal to the site of block. This is in contrast to thrombosis in which the occlusion is more gradual and collateral flow may be sufficiently adequate to prevent visible infarct.

It is likely that emboli, when they come to a stop in a vessel, not infrequently break into pieces which are carried into the most peripheral small vessels. Often at necropsy the pathological picture is one of infarction due to cerebral embolism yet no occluding blood clot or embolus is found at the appropriate site, the lumen being quite empty. In several such cases I have been successful in demonstrating embolic material in the small outlying peripheral branches, leading me to the conclusion that emboli do in fact break up. In this paper many such cases are classified as cerebral embolism although more accurately they probably belong in the group of undetermined etiology. Hicks and Warren,¹ not finding any occlusion within the appropriate vessel in similar cases, concluded that cerebral vasospasm was responsible. The authors, however, did not consider the above behaviour of embolic material and the incidence of auricular fibrillation or cardiac mural thrombi in their cases was not reported. Moreover, it was not stated if fixing fluids had been injected into the cerebral vessels, a point of some importance, for embolic material might be dislodged by such injection. Another fault in their study lay in the fact that the carotid arteries were not specially examined at autopsy to rule out obstruction not evident in the usual routine postmortem examination.

Infarction due to embolus may be pale or hæmorrhagic. The paradox of hæmorrhage occurring distal to an embolic plug has attracted investigators for a century, but there is no unanimity of opinion regarding its pathogenesis. From studies of the process in the brain it would appear that an embolus after being arrested at one site sufficiently long to cause pale infarction sometimes moves distally allowing some influx of blood into previously blocked branches and it is in the territory of these unblocked branches that petechial hæmorrhage occur producing the picture of hæmorrhagic infarction. Red infarction which appears to be the hall-mark of embol-

ism and not thrombosis usually occurs in association with pale softening, the hæmorrhagic portion always lying proximal to the pale. Hæmorrhagic infarction can occasionally lead to xanthochromia of the cerebrospinal fluid and the diagnosis of a cerebral hæmorrhage be erroneously made. In a few cases hæmorrhagic infarction has subsequently led to a raised serum bilirubin in the same fashion as pulmonary infarction.

Infected emboli arising from vegetations in subacute endocarditis may give rise to mycotic aneurysms, ordinary infarcts or septic infarcts with or without secondary hæmorrhage. Infected emboli from vegetations in acute bacterial endocarditis give rise to the above and in addition may cause multiple hæmorrhagic or pale brain abscesses. Focal disease of the brain is rare in an uncomplicated bacteraemia although meningitis is not uncommon.

CLINICAL PICTURE

The clinical picture in cerebral embolism is very variable depending upon the part of the brain affected, the size of the embolus, etc. Usually there is a hemiplegia whose severity and duration can be most variable. However, it is important to appreciate that there need not be any gross paralysis at all. Other commonly associated symptoms and signs include paresthesia, aphasia, dementia, confusion, dizziness, hemianopsia and blindness. Of first importance in the diagnosis is the suddenness of onset of symptoms. The details of the onset may be known if the patient is awake, but if the stroke has come on during sleep or the patient awakens to find himself paralyzed, the character of the onset will not be known. Cerebral embolism usually leads to a complete development of symptoms within 10 to 30 seconds. Secondly, there must have been no minor prodromal warnings since an embolus obviously would not strike in exactly the same spot twice. Thirdly, for the diagnosis of embolism there should be either a likely source of embolus or evidence of emboli elsewhere in the body, *e.g.*, spleen, kidney, limb or bowel. Yet due to the brain's extreme sensitivity to ischaemia, small emboli result in cerebral lesions when other organs show no discoverable infarcts. Even when infarcts are found in these other organs, symptoms may have been entirely lacking. The cerebral symptoms may be very transient as in a recent personal case of a woman with auricular fibrillation who, for 20 minutes had jargon

dysphasia which then cleared up completely. Such cases commonly are wrongly designated as vasospasm.

Mental symptoms in cardiac cases are not infrequently due to small cerebral emboli in which paralysis is not a striking feature. It was stated above that the complete clinical picture in cerebral embolism develops within 10 to 30 seconds and while this is true in the great majority of cases, a few instances have been encountered in which it appeared that an embolus could have temporarily lodged at a bifurcation proximal to the Circle of Willis (innominate, external carotid or ophthalmic artery) causing transient symptoms which preceded the arrival of the embolic material in the cerebral vessels proper and the actual development of an acute stroke.

CEREBRAL HÆMORRHAGE

Hæmorrhage can be primary as in hypertension or secondary to one of several conditions including trauma, septic embolism and bleeding from a saccular aneurysm, mycotic aneurysm, arteriovenous aneurysm, or hæmangioma. Hæmorrhage may also result from excessive doses of anti-coagulants and from thrombocytopenia or any other illness characterized by a bleeding tendency. It may be the first sign of an intracerebral secondary tumour deposit from kidney, placenta, pancreas, liver, etc. Occasionally a red infarct due to embolism goes on to form a small hæmorrhage. Secondary midbrain hæmorrhages produced by transtentorial herniation of the temporal lobe in association with large supratentorial expanding lesions are not of concern at present for, although they may complicate, they are never primarily responsible for the clinical picture of stroke. A special word concerning trauma is advisable, for a mild hemiplegia in an elderly person may prove to be due to a slowly enlarging subdural hæmatoma which might have been removed surgically at an earlier stage and yet no history of trauma be elicited. It is not uncommon for a patient to be found hemiplegic and semicomatose with evidence of cranial trauma, posing the question of whether the head injury is primary or secondary. In this regard it can be said that a clear-cut severe hemiplegia is rarely due to trauma, an acute extra- or sub-dural hæmorrhage occasionally being responsible. Hæmorrhage secondary to a septic embolus or bleeding tendency in most cases causes no difficulty in diagnosis, although

when cerebral phenomena are the initial signs of the illness the opposite may be true. In the latter, petechial hæmorrhages are usually present in the skin before bleeding occurs into the brain. Hæmorrhage into a primary or secondary tumour of the brain is not uncommon, but only occasionally is the diagnosis in doubt. Rarely, cerebral hæmorrhage occurs without a definite recognizable cause, but small angiomas obscured by the hæmorrhage are suspected. Chronic liver insufficiency occasionally is associated with an otherwise unexplained cerebral hæmorrhage, prothrombin deficiency being suspected.

At present our interest must be confined to primary intracerebral hæmorrhage and that secondary to berry aneurysm. Primary intracerebral hæmorrhage at least for practical purposes is always a manifestation of high blood pressure and should not be diagnosed in the absence of hypertension. The blood pressure does not drop significantly in the early stages of a cerebral hæmorrhage and the pressure as first measured is probably an accurate indication of the pressure before the onset of the stroke. Intracerebral hæmorrhage generally occurs while the patient is awake and a stroke coming on during sleep is rarely due to hæmorrhage. The onset of the full-blown clinical picture may be sudden, but usually is not and the paralysis gradually worsens over a period of several minutes, an hour or very occasionally a day. This is a reflection of the size of the arterial leak and its proximity to important cerebral pathways. Prodromal warnings or fleeting symptoms are extremely rare and this is as expected since rupture of a vessel is an all or none phenomenon. The neck is not stiff in the early stages, but becomes so later unless the patient is in deep coma. It has become our practice not to do a lumbar puncture in the acute stage of a primary intracerebral hæmorrhage, but to delay a week or so when xanthochromia produced by seepage of blood pigment into the ventricular or subarachnoid spaces is diagnostic. However, if a "working diagnosis" cannot be reached clinically a lumbar puncture is done in the early stages.

TYPES OF HÆMORRHAGE

Hæmorrhages may be classified as massive, small, slit and petechial. "Massive" is a convenient term to refer to extensive hæmorrhages which gradually enlarge and finally rupture into the ventricular system causing deep coma and

death. Of course a relatively small hæmorrhage situated centrally in the midbrain or pons will cause deep coma within a matter of a few minutes, a typical history being that the patient complained of sudden, severe headache, vomited and fell unconscious. There are special sites of predilection for massive hæmorrhages namely, the putamen, the white matter immediately anterior and posterior to the putamen, the thalamus, the pons and the cerebellum. At least 60% are in or near the posterior portion of the putamen, and in such cases a hemiplegia will be discernible on examination or will have been present in the period shortly after onset. A "small" hæmorrhage is simply an abortive, massive one and occurs in the same regions, but for some reason does not reach fatal proportions. Such a hæmorrhage into the putamen causes a hemiplegia due to pressure on the adjacent internal capsule. A small hæmorrhage into the cerebellum, by no means an uncommon occurrence may cause a pronounced disturbance of gait without any frank paralysis, the picture being so bizarre that hysteria is erroneously diagnosed. The presence of nystagmus in the acute stage helps to make the correct diagnosis. A small hæmorrhage into the thalamus may occasion a picture akin to that of senile dementia. "Slit" hæmorrhages less common than the two types above are small hæmorrhages which occur just beneath the cortex at the junction of grey and white matter. Usually no more than 2.5 cm. in diameter when new, they gradually narrow to an orange slit as healing occurs. Focal seizures often result, both in the acute and chronic stage. At the onset there may be aphasia, hemianopsia or motor paralysis, but the prospect for recovery is much better than in the two previous types. Petechial hæmorrhages are found in some cases of so-called acute hypertensive encephalopathy associated with brain oedema, but only as a terminal phenomenon.

The pathogenesis of primary cerebral hæmorrhage is not known. I believe, it is true that no one has as yet seen the actual site from which hæmorrhage arises and, indeed, there is no clear idea of the size of the vessel in which to look. The average volume of a fatal intracerebral hæmorrhage, is 50 to 75 c.c. This amount would accumulate in an hour if only one drop of blood escaped with every four beats of the heart. In other words, the hole in the vessel as well as the involved vessel itself could be quite small.

Hæmorrhage arises as a rule from the deep penetrating branches to the putamen, thalamus, pons and cerebellum. These vessels are small (less than 1 mm. in diameter) and arising from large trunks must be subject to a higher pressure than similar-sized vessels on the surface. Also as has been mentioned, these vessels are end-arteries.

The various theories concerning the pathogenesis of cerebral hæmorrhage include: (1) "Simple" rupture of the vessel; (2) Rupture of a miliary aneurysm, (Charcot); (3) Bleeding secondary to loss of the support around an artery due to an adjacent small brain softening itself possibly due to vasospasm; (4) Coalescence of scattered diapedetic capillary hæmorrhages. There is no reliable evidence in favour of the last three, but the first, "simple" rupture is consonant in many ways with the clinico-pathologic picture of intracerebral hæmorrhage: close correlation with hypertension; marked tendency to occur during the day when blood pressure is higher; the exceedingly rapid onset of symptoms in pontine hæmorrhage and often in putaminal hæmorrhage too; the absence of prodromal attacks; the total lack of correlation with brain softening; and the tendency to occur in the territory of penetrating arteries. Cerebral hæmorrhage in my experience is never due to a "ruptured plaque of atherosclerosis" and hæmorrhage probably has no direct relation to atherosclerosis. At any rate, hæmorrhage has resulted in young people from an overdose of adrenalin and also during acute hypertension associated with adrenocorticotropin therapy, situations in which atherosclerosis played no rôle whatsoever.

The therapy of massive cerebral hæmorrhage at present consists of occasional attempts at surgical evacuation of the clot. It seems to me that such surgery has not yet been exploited to the full. In the most severe cases operation would have to be done early as an emergency measure, but then accurate diagnosis becomes a major obstacle. In case of hæmorrhage say from a limb, one stems the flow with pressure on the main artery of the limb, but as far as I know, digital pressure on the carotid artery has not yet been given a trial in hypertensive intracerebral hæmorrhage. Two years ago, I was able to try it in the case of a hypertensive patient who noted the onset of hemiplegia while I happened to be on the ward. The hemiplegia did not go on to a disastrous one, but the diag-

nosis of hæmorrhage has never been confirmed. Again the drawback in trying such a manœuvre is the difficulty in making an accurate diagnosis early in the stroke. When blood has reached the cerebrospinal fluid, it is generally too late. The fact that hæmorrhage usually occurs during waking hours, may mean that relatively small blood pressure changes are significant. It is thus possible that the use of hypotensive drugs in the early stages of an hæmorrhage might serve to arrest the bleeding. The prophylactic therapy of cerebral hæmorrhage seems quite clear, namely: prevent or alleviate arterial hypertension. The prognosis in cerebral hæmorrhage is bad, both for survival as well as recovery from the paralysis. A transient stroke with prompt recovery is most unlikely to be an intracerebral hæmorrhage.

BERRY ANEURYSM

Rupture of a berry aneurysm is by no means uncommon, occurring in about 1% of routine autopsies. Another 1% have an unruptured incidental berry aneurysm. These aneurysms are due to out-pouchings of the intima through sites of congenital defect in the media and elastica of the cerebral arteries. All occur at arterial bifurcations or branchings. They are uncommon in children, not infrequent in the thirties and forties and, in general, increase in frequency with increasing age. In one case an astute house physician made the correct diagnosis in a man of 84. Aneurysm has a special tendency to be associated with coarctation of the aorta and cystic disease of the kidney. Almost all aneurysms are on the anterior half of the Circle of Willis, an occasional one occurring on the basilar system. They vary in size from 2 mm. up to a few cm. They are multiple in about 25% of cases. Signs of direct local pressure due to an enlarging aneurysm include monocular blindness, optic atrophy, paralysis of the 3rd, 4th and 6th (oculomotor) nerves, headache, memory defect and occasionally hypothalamic disorder, all of the involved structures lying adjacent to the Circle of Willis. These signs although absent in the majority of cases are typical and diagnostic when present. Rarely do aneurysms give rise to a stroke before rupturing, but in a recent personal case a previous stroke appeared to be due to the incorporation of a penetrating artery of the lenticulo-striate group into the wall of an aneurysm, a sudden paralysis having resulted.

Emboli can arise from an aneurysm and be carried distally, resulting in paralysis.

The clinical picture associated with rupture of a berry aneurysm can be highly variable. The most characteristic picture consists of a sudden extremely severe headache with little or no paralysis. Not infrequently, an abrupt loss of consciousness is the initial event, recovery occurring in minutes, hours or days, and being associated with a severe persistent headache. This syndrome of temporary unconsciousness followed by severe headache and little or no paralysis, is quite specific for ruptured aneurysm and no other vascular disease mimics it. There is not time now to enter into a discussion of headache associated with strokes. It can occur in all types, but that association with ruptured aneurysm is almost unique in its severity. The temporary loss of consciousness is probably due to the sudden increase in pressure of the cerebrospinal fluid around the basal structures particularly the thalamus and midbrain. Memory defect and confusion are common during the period of recovery. Usually the first hæmorrhage is not fatal, but in at least 50% of cases recurrent episodes of bleeding with fatal outcome follow in days or weeks.

Thus, in this type of hæmorrhage, it can be said that development of the fullblown picture is episodic rather than all or none as in primary intracerebral hæmorrhage or embolism. The onset of the initial rupture as well as of the recurrences invariably takes place during waking hours, an act of exertion (lifting, climbing or a bowel movement) often being the precipitating factor. After rupture the neck is always stiff, sometimes retinal hæmorrhages are found on the side of the aneurysm and occasionally an intracranial bruit can be heard. The cerebrospinal fluid is always grossly bloody but in my experience the clinical picture particularly the onset or prodromal phenomena enables a diagnosis on clinical grounds alone in most cases, without the aid of a lumbar puncture. In 60% of cases, aneurysms although lying in the subarachnoid space, rupture, at some time in their course, partly into brain tissue, giving rise to a large intracerebral hæmatoma and resulting paralysis, but this is not the initial event as a rule.

The cause of the actual rupture is not known but "simple" tearing of the wall probably is responsible. It has been mentioned that although rupture of an aneurysm at times results in a

rapidly fatal hæmorrhage, it is more common for smaller repeated episodes of bleeding to occur, quite unlike primary intracerebral hæmorrhage. The significance of this is deducing the mechanism of arterial rupture in the two types of hæmorrhage is not clear. Hypertension is not requisite by any means and indeed, in most cases of aneurysm the blood pressure is normal. Atherosclerosis may or may not be present. Berry aneurysms have not been described in other regions of the body but in our laboratory, an unruptured one was found at the first branching of the main renal artery.

The therapy of ruptured aneurysm is highly unsatisfactory and most cases end fatally. More and more cases are being reported in which clipping of the aneurysm or covering of the defect with muscle has been successful. Ligation of the carotid artery on the same side is also practised. Whether the neurosurgeon tends to select the cases which would have survived any way is problematical. Cerebral hæmorrhage, particularly in young people, occasionally results from the rupture of a cerebral arterio-venous aneurysm. Arteriography will enable diagnosis of the lesion, which may be amenable to surgical extirpation.

CEREBRAL THROMBOSIS

Cerebral thrombosis, the last of the "big three" of strokes, has several underlying causes. The meningitis of syphilis or tuberculosis is prone to produce an arteritis in the cerebral vessels which lie bathed in the inflammatory process and secondary thrombosis then ensues. Thrombosis due to polyarteritis nodosa or isolated cerebral arteritis is an uncommon occurrence. Thromboangiitis obliterans is said to occur in cerebral arteries but so far I have not been able to confirm this. Thrombophlebitis of venous sinuses or surface veins following mastoiditis, sinusitis, dehydration or pregnancy can result in œdema or hæmorrhagic infarction of the brain producing the picture of a stroke. There is a constant trickle of such cases and the diagnosis must be kept in mind.

However, the great majority of cases of cerebral thrombosis have atherosclerosis as their pathological basis and it is this group which will now be discussed. Since atherosclerosis is the real villain a knowledge of its behaviour in cerebral vessels is requisite to an understanding of cerebral thrombosis. The atherosclerotic pro-

cess is not fundamentally different from that encountered in vessels elsewhere as in aorta, coronary and leg vessels. It is most common in people of advanced years but even the thirties are not immune. It is a focal disease in cerebral arteries, showing a definite predilection for certain points in the vascular tree, namely branchings, bifurcations and bends. This tendency is clearly evident from the following list of sites of predilection arranged in their approximate order of frequency and severity; the carotid sinus, the paraclinoid portion of the internal carotid artery, the bifurcation of the internal carotid artery into anterior and middle cerebral arteries, the first bifurcation of the middle cerebral artery, the tip of the vertebral artery as it enters the spinal canal, the lower and upper bifurcations of the basilar artery, the posterior cerebral artery as it winds around the cerebral peduncle and the anterior cerebral artery as it bends upward around the genu of the corpus callosum. In most cases, these are the sites of cerebral thrombosis of large vessels, due to atherosclerosis, particularly in the normotensive patient.

The fine details of the manner in which cerebral atherosclerosis leads to thrombosis and occlusion is not clear, for atherosclerotic plaques as a rule do not ulcerate as they do in the aorta, affording an unhealthy surface upon which a thrombus can originate. It is likely that the blood flow becomes so slowed distal to the narrowed portion of an artery that stagnation, perhaps along with other factors, leads to intravascular clotting. Occlusion of the lumen with resultant cerebral infarction seems to be a gradual process for, as will be discussed later, prodromal symptoms or warnings are extremely common. Furthermore the final clinical picture may take hours or days to develop fully. In favour of slowing of the blood stream is the fact that cerebral thrombosis is prone to occur during sleep or during the hypotensive interval after hæmorrhage or myocardial infarction.

Thrombosis of the large vessels at the base of the brain is not as frequent as cerebral embolism and hæmorrhage. In the past there has been a tendency to attribute almost every stroke to thrombosis of the middle cerebral artery but in my material this is quite uncommon and such a clinical diagnosis is almost invariably wrong. In our laboratory routine investigation of the internal carotid arteries in the neck and within the skull has already uncovered 43 cases of uni-

lateral or bilateral occlusion, there being an old or recent brain softening in 35 cases. It is only in recent years that occlusion of the carotid artery has attracted attention as a common cause of strokes and it should be emphasized that when these vessels are not investigated at autopsy a good clinico-pathological correlation is frequently impossible. Carotid blockage due to syphilitic and dissecting aneurysms of the aorta, although rare, is of course well recognized.

Next in frequency of occlusion after the internal carotid artery, come the vertebral, basilar and posterior cerebral arteries. Thrombosis of the basilar artery is not uncommon and is usually preceded by occlusion of one or both vertebral arteries. Closure of the posterior cerebral artery also far from rare, usually occurs where the vessel turns posteriorly rounding the cerebral peduncle. Thrombosis here seems to be but little appreciated both by clinician and pathologist. It has been previously pointed out that thrombosis may be such a gradual process that complete occlusion of a vessel occurs without causing a stroke or cerebral infarction, collateral flow having time to compensate fully. I have seen this in the anterior, middle and posterior cerebral arteries as well as in the vertebral. From time to time, cases are seen in which occlusion of an artery takes place without leading to infarction distal to the point of blockage, yet obstructing the penetrating side branches which arise immediately at the site of occlusion. From our study of occlusion of the carotid artery, it would appear that during arterial thrombosis, pieces of clot may break away and act as emboli. This phenomenon has not been reported in the case of leg and cardiac vessels, but it should occur there too.

It was mentioned above that the sites of predilection described referred particularly to normotensive patients, for it is a fact that hypertension clearly alters the distribution of cerebral atherosclerosis, by leading to its deposition in smaller vessels. For example the small vessels on the undersurface of the cerebellum are frequently affected by atherosclerosis in hypertension but I have never seen atherosclerosis there in its absence. Hypertension also leads to atherosclerosis of the smaller vessels over the lateral surface of the cerebral hemispheres. But of much greater importance is the tendency, in the presence of high blood pressure, for atherosclerosis to be laid down in the penetrating

branches of the middle cerebral arteries (the lenticulo-striate group), the thalamic branches of the basilar system, the pontine and cerebellar branches of the basilar artery as well as other small vessels such as the posterior inferior cerebellar artery or the central artery of the retina. As the penetrating arteries are end-arteries and collateral flow is minimal, occlusion usually leads to infarction. Also, since the vessels are of small calibre the infarcts resulting from occlusion tend to be small, especially as compared with embolic lesions and those due to thrombosis of larger vessels. It should be made clear that the deposition of atherosclerosis in smaller vessels in hypertension is in addition to its deposition in the larger vessels, but even in these the process is somewhat altered, consisting of a more uniform distribution rather than the focal deposit of the normotensive. Indeed one can make reliable deductions regarding the presence or absence of hypertension from an examination of the cerebral vessels.

Especially common in hypertension is closure of the small vessels running to the lenticular nucleus, internal capsule, thalamus and basis pontis. This leads to small softenings in these regions and when healing occurs small trabeculated cavities a few mm. in diameter are left behind. It is not generally appreciated that it is these small lesions which are responsible for the repeated minor strokes so frequently seen in patients with high blood pressure. Characteristically there is a history of hemiplegia or hemiparæsthesia lasting for only a few days or weeks and followed by rather good recovery. As the attacks continue the patient develops increasing spasticity of the limbs, difficulty in swallowing, spastic disturbances of speech and pathological laughing and crying; in short, the picture of pseudobulbar palsy. Pathologically in such cases there may be 8 or 10 or more small cavities within the basal ganglia and basis pontis, the so-called *état lacunaire* of Marie. Mild dementia is not uncommon, due either to the number of lesions or more likely to their localization. If we can believe the clinical records many of these lesions must occur silently, for at autopsy several lacunes may be found and yet there is a history of only one or two strokes. It is extremely uncommon for multiple lacunes to occur in normotensives, although occasional ones are seen at advanced ages and in diabetics whose

special proneness to atherosclerosis is well known.

Although these small softenings are possibly the most frequently encountered lesions in stroke cases, the pathological process taking place in the vessels leading to these lesions has never been methodically investigated. In three cases we have studied serial sections of the basal ganglia so prepared as to enable us to follow the penetrating vessels supplying the small infarcted regions. Invariably a vascular occlusion has been found so that vasospasm need no longer, as it has in the past, be incriminated as the cause of the lesion. The vascular occlusion usually consists of a striking atherosclerotic plaque which readily takes a fat stain. Such plaques have been found in vessels down to 150μ in size, normotensive vessels of this size never showing such a change. The pathogenesis of the final occlusion of these penetrating arteries could not be worked out from our material. It had been hoped that processes of all ages might be encountered, but so far only old occlusions consisting of atherosclerotic plaques and closure of the remaining lumen by collagenous connective tissue have been seen. Although the occlusion is probably due to thrombosis and here it is regarded as such, full proof is still lacking. At least it is clear that hypertension itself does not lead to closure of cerebral vessels, but that atherosclerosis is the basic factor.

CLINICAL PICTURE

The clinical picture in cerebral thrombosis covers an extremely broad spectrum of signs and symptoms. Hemiparesis, quadriplegia, paræsthesia, aphasia, dysarthria, dizziness, ataxia, confusion, dementia, visual field defect, blindness, dysphasia, pseudobulbar palsy, stupor and coma cover most of the encountered phenomena. The most important single factor pointing to cerebral thrombosis is a history of prodromal transient episodes preceding the final arrival of the stroke. No other type of stroke is associated with warning symptoms except rupture of a berry aneurysm as already mentioned. Primary hæmorrhage and embolism always strike without preliminary manifestations. However thrombosis does not always produce transient warnings and this is especially true in hypertensives. Another important characteristic of thrombosis seen sometimes is the development of neurological symptoms over a period of several days, in con-

trast with embolism, which is abrupt and with hæmorrhage where the onset is a matter of minutes or hours. As the hemiplegia develops in cases of thrombosis the fractions of paralysis are added from time to time in stuttering staccato fashion rather than in the smooth progression characteristic of brain tumour, subdural hæmatoma or brain abscess. A smooth gradual onset of hemiplegia is never due to thrombosis. Another point in favour of thrombosis is its tendency to come on during sleep or during periods of abnormally low blood pressure (myocardial infarction, gastro-intestinal hæmorrhage). Cerebral hæmorrhage as indicated is prone to occur during waking hours and not during sleep or shock. Cerebral embolism of course may occur as well in sleep as in waking.

Differentiation of the type of stroke becomes difficult when the character of the onset is either not known or it is known to have been abrupt or sudden. The full blown, early neurological picture in each type of stroke can be almost the same, so accessory data must be sought. The presence of auricular fibrillation or a past or recent myocardial infarction favours embolism. Hypertension for practical purposes is requisite for the diagnosis of cerebral hæmorrhage. The presence or absence of coma is often used as a differentiating point but all types of stroke can occasion deep coma. On the other hand the presence of a profound hemiplegia and a relatively preserved mental alertness is against hæmorrhage but this is as far as one can safely go. A lumbar puncture may help to determine if hæmorrhage has occurred, stiffness of the neck assisting on the clinical side. But in this group a good number of cases will remain undiagnosed.

In passing it might be appropriate to mention briefly the occurrence of strokes under more unusual circumstances. A persistent hemiplegia coming on during what appears to be a typical migraine headache although rare is a well recognized phenomenon. I have encountered two cases of hemiplegia following upon heavy coughing and in one of these coughing had previously caused transient numbness of the involved side. Unusually heavy exertion too can precipitate paralysis in the absence of a berry aneurysm. The pathological substrate in these three kinds of stroke remains unknown.

From the above remarks there emerges the fact that in the early stages of a stroke, the nature of the onset and the intimate details of

and prodromal symptoms are of prime importance in making a diagnosis. Transient warning attacks often called vasospasm, in my experience, are extremely common in cases of cerebral thrombosis and many such examples have now been verified pathologically. Transient phenomena consist of hemiparesis, paræsthesia, dysphagia, dizziness, diplopia, central blindness, monocular blindness, headache, vomiting, weakness of the legs, loss of memory, confusion and dementia. Convulsions are rarely if ever the prodrome of a stroke due to thrombosis but they can well follow upon such a stroke. The fleeting prodromal attacks may be frequent or few and may precede the final stroke by months, weeks, days or hours. Recovery from the first attacks may be complete, but sooner or later some neurological deficit persists until the final picture is precipitated. A few striking case histories will serve for illustrations:

1. A man aged 58, over a period of two months suffered at least 500 transient attacks of numbness around the mouth and numbness of the left thumb and index finger. Attacks lasted about two minutes, came about eight times a day and in between the patient felt perfectly normal. After two months he awakened one morning with a severe left hemiplegia which has persisted.

2. A man aged 63, had, over a period of eight months, at least 100 attacks characterized by a severe pounding behind the left ear, a steady headache over the left eye, marked rotatory dizziness, vertical diplopia, paralysis and numbness of the right hand and inability to speak a word, although he knew what he wanted to say. He was completely aware during the attacks which lasted 15 to 40 minutes. Finally he developed three attacks of deep unconsciousness, the last of which was fatal. Pathological examination showed occlusion of the left vertebral artery and a more recent thrombosis of the lower basilar artery.

3. A hypertensive woman aged 40 awakened one morning with severe paralysis of the left face, arm and leg. Recovery was complete in about 20 minutes. During the next four days at least 50 similar transient attacks occurred, but on the morning of the fifth day she awakened with a severe hemiplegia which took about ten days to disappear.

Such spectacular cases are not rare, but it is more common for only one or two warnings to precede the final stroke.

A man aged 40 was working one day and suddenly found himself lying on his back with all his limbs powerless. Within a few minutes he recovered, but next day all power again left his limbs for about half an hour. The following day he awakened to find all limbs completely paralyzed, recovery occurring over a period of a year.

A man aged 66 awakened one morning with a severe hemiparesis. A careful history elicited the fact that in the previous month he had had three transient attacks of blindness in the right eye and several attacks of loss of feeling in the left hand. Another patient, a man aged 59 who also awakened one morning with a severe right hemiplegia had had several transient attacks of numbness and inability to use his hands in the previous week.

Often the earliest symptoms of an approaching stroke consist of dementia, confusion, loss of memory and perhaps the picture of a senile psychosis.

A man aged 84 had had an unusually capable mind, until one day when he awakened in a confused and disorientated state. This continued for one week and then on the following morning, after an unusually deep sleep due to sedative, he was found with a severe right hemiplegia to which he succumbed.

Another patient aged 61 came to the medical clinic in a confused, disorientated state. He said he felt tired, depressed and was unable to sleep. He had difficulty in expressing himself. Two days later he awakened with paralysis of the right side of the body. In such cases the presence of dysphasia provides a clue to the nature of the dementia.

I have dealt at some length with the matter of warning phenomena because it seems to me that if one is going to try and do something constructive in these cases, the most logical time is during the period of prodromal phenomena before full paralysis or loss of mind has developed. A recent case is perhaps instructive in this regard.

The patient a woman aged 70 had been having transient attacks of a numbness, weakness and vomiting for five or six months. For one month she had been having episodes once or twice a day in which all power seemed to go out of her body, the right hand and occasionally the right face became numb and in addition there was a peculiar, "terrible" sensation in her head. The attacks lasted only a few minutes but usually an hour passed before she felt herself again. On admission to hospital neurological examination was normal. She was observed for 18 days during which time there occurred repeated transient attacks of paralysis and numbness of the right side of the body, as well as dysphagia and at times weakness of all four limbs. As the days passed, full recovery no longer occurred between attacks, the right hand remained weak and numb. A clinical diagnosis of thrombosis of the basilar artery was made and in an effort to stop the progress of the thrombosis, heparin and dicoumarol were administered.

For the next thirty-three days there were no transient attacks whatsoever and it was decided to stop anticoagulant therapy. Four days later three further transient episodes occurred in one day, so anticoagulant therapy was started again. For the next fifteen days there were no further transient episodes and it was decided to try the patient again without anticoagulants but administer a placebo pill instead. Three days later the patient awakened with numbness of the right side and later in the day vision became blurred, speech was slurred and she felt weak all over. Two hours later she felt well again. A similar attack occurred two days later, but with slower recovery. Anticoagulant therapy was again started, but only three doses of heparin were given instead of the previous six. Two days later before dicoumarol therapy was effective, the patient developed a complete quadriplegia associated with inability to swallow, speak or see. The attack reached its peak in four hours. Heparin was given as an emergency measure, dicoumarol being continued. Within a few days speech was no longer slurred, in a week swallowing was perfect and in two weeks she could walk as well as before the last attack. She was sent home on dicoumarol therapy which was continued for five months. There has been no recurrence of neurological symptoms since cessation of anticoagulant therapy 10 weeks ago. This might well be a case in which anticoagulant therapy

not only prevented attacks of what are called cerebral vasospasm, but enabled the patient to survive occlusion of the basilar artery.

In a more recent case a man aged 55 developed aphasia and inability to speak over a period of a day or so. When first seen two days later he said that from time to time during the day his right hand would become temporarily "floppy". There was no paralysis. Since the centre of speech and mind seemed threatened and the floppy attacks of the arm perhaps presaged further trouble, anticoagulant therapy was begun. No further episodes occurred and full recovery took place over a period of two weeks. Therapy was continued for two months and no untoward effect has been noted since medication was stopped two months ago.

These case reports are only tentative suggestions that something might be done to alter the course of strokes due to thrombosis, if therapy is started early. Unfortunately, patients usually do not seek medical attention before full disaster has struck. Of course any benefit of anticoagulant medication must be weighed against the possible dangers of such therapy. Not always is the final stroke a severe or permanent one, so that therapy with any significant inherent danger would not be justified. For the present, anticoagulant therapy is being avoided in the presence of severe hypertension. It goes without saying that our ultimate aim, the prevention of cerebral thrombosis lies in the prevention of atherosclerosis itself.

There is not time at present to enter into a discussion of the clinical picture associated with occlusion of each of the cerebral arteries supplying cerebrum, brain stem and cerebellum. Many have an associated clinical syndrome so typical that they bear an eponymic designation, but partial and mixed pictures are the rule rather than the exception. In the absence of hypertension, I usually do not picture thrombosis of the small penetrating branches of the middle cerebral or basilar arteries, nor of the superficial cerebral vessels, the cerebellar arteries or the central artery of the retina, whereas when high blood pressure is present I give these sites prime consideration. In normotensive patients thrombosis of the internal carotid, the vertebral, the posterior cerebral and basilar arteries must be thought of. A history of slow stuttering onset of hemiplegia associated with contralateral transient monocular blindness, unilateral frontal headache and absent pulsation of the internal carotid artery in the neck are diagnostic features of occlusion of the internal carotid artery.

So far there has not been occasion to discuss hypertensive encephalopathy. From conversation with my colleagues it seems that the term

includes almost every neurological symptom and sign occurring in hypertension. Headache, dizziness, convulsions, dementia, attacks of vasospasm and small strokes are often referred to under the term. A classification into acute and chronic hypertensive encephalopathy can be convenient when the former is used for the acute often terminal syndrome comprised of headache, vomiting, papilloedema, convulsions, stupor and coma, associated with brain oedema, while chronic hypertensive encephalopathy is used to refer to the state following upon repeated small strokes and attacks of so-called vasospasm. Headache and dizziness do not as a rule connote disease of the brain. Typical vertigo even of sudden onset as an isolated symptom in the hypertensive patient rarely indicates a stroke, being generally of labyrinthine origin. Repeated convulsions in the chronic hypertensive patient are due to a previous cerebral softening or hæmorrhage or to unrelated brain disease. Most instances of "vasospasm" occur during the final thrombotic closure of vessels seriously narrowed by athero-

sclerosis but a full account of what is called vasospasm would take us too far afield at present.

Thus chronic hypertensive encephalopathy becomes a matter of repeated small strokes with or without dementia and no particular disadvantage attaches to the use of the term, if the underlying pathological basis (*état lacunaire* or small hæmorrhages) is kept clearly in mind. It must be remembered that cerebral embolism frequently complicates hypertension, the embolus usually arising from a diseased heart. Often entirely unrelated diseases such as berry aneurysm, tumour, abscess, meningitis and senile or presenile dementia must first be ruled out before the illness is ascribed to hypertension.

For this work laboratory facilities were provided in the Department of Pathology at The Montreal General Hospital through the initiative and kindness of Dr. Joseph Pritchard and Dr. Francis MacNaughton. Dean Lyman Duff was most generous in his support of the project. This paper is in part a report of the work carried out there in the past three years.

BIBLIOGRAPHY

1. HICKS, S. P. AND WARREN, S.: Infarction of the Brain Without Thrombosis, *Arch. Path.*, 52: 403, 1951.

AFTER EFFECTS OF WESTERN EQUINE ENCEPHALOMYELITIS INFECTION IN MAN*

J. S. FULTON, D.V.M., D.V.S. and
A. N. BURTON, D.V.M., *Saskatoon, Sask.*

THE HISTORY of western equine encephalomyelitis (W.E.E.) in Saskatchewan does not reveal when the first human cases occurred in this province. Most of the early cases had been regarded as non-paralytic poliomyelitis but doubt arose when they occurred in increasing numbers and frequently in districts free from typical poliomyelitis. Attempts, therefore, were made to determine the true nature of the disease by the isolation of the causative agent.

In 1939 the virus of W.E.E. was recovered from two cases of the hitherto undiagnosed disease, while neutralization tests done on others proved that they too had suffered from the same condition. Since that time cases have been diagnosed each year by virus isolation or by means of neutralization tests against the equine virus. Some seasons the disease assumes epidemic pro-

portions as it did in 1938, 1940, 1941 and again in 1947, while in other years isolated cases appear over widely scattered areas throughout the Province.

Although there has been no serious outbreak of W.E.E. during the past few years and the death rate is much lower than it was in early outbreaks, the disease is still important from a public health point of view but unfortunately its real seriousness is not yet fully appreciated. It is common knowledge that paralysis may follow poliomyelitis and unless proper treatment is instituted immediately permanent injury may be expected. Because of this, poliomyelitis is more generally feared than is W.E.E. and during outbreaks extreme efforts are made to prevent the spread of the disease.

It is not yet generally known that the after effects of W.E.E. may be even more serious than those resulting from poliomyelitis. It has been realized for some time by doctors and those engaged in the study of this disease that after apparent recovery there may develop symptoms indicative of injury to the central nervous system. That mental disorders may result from infection by the equine virus was first suspected from cases occurring in infants. In some of these

*From The Virus Laboratory, University of Saskatchewan, Saskatoon.

patients mental changes occurred almost immediately after the acute symptoms had subsided. One of the first early cases of this type was that of a child nine months old who had been quite normal prior to contracting the disease. Proof that we were dealing with W.E.E. was obtained by neutralization tests, a negative reaction being secured when the disease was first suspected and a positive after fourteen days. A year later there was no improvement in the mental condition of the child and when death occurred a short time afterwards the brain showed changes typical of western encephalitis.

Although these mental changes were observed in children quite early in the course of our study it was not until a survey was made to determine the fate of adults who had suffered from the disease that it was realized that many had been similarly affected. Mental impairment in adults due to infection with the equine virus in most cases develops gradually, and perhaps not for a year or more after recovery does the patient exhibit symptoms sufficiently marked to demand medical aid. In the course of the survey the co-operation of the family doctor was sought and an attempt made to obtain follow-up reports on all cases confirmed in our laboratory over the twelve year period from 1940 to 1952. As was to be expected, many of the earlier patients could not be traced, but a surprisingly large number of those where a history was obtained had developed mental symptoms and later died. Sufficient information was secured to show that the after effects of W.E.E. are much more common and serious than was hitherto thought. Of 101 cases, the information obtained showed that 15 presented the symptoms listed in the table.

Information received from one doctor is as follows:

"I may say that during the epidemic we had some thirty odd cases with W.E.E. There were about six deaths. One child who recovered had epileptic seizures. About four of the elderly people all showed signs of fairly rapid senility after recovery following W.E.E. Another case was that of a little girl who developed facial paralysis at the time of the infection." (The outbreak this doctor referred to was that of 1941.)

Considering that known cases of W.E.E. have terminated in mental disturbances sufficiently severe to require confinement in mental hospitals, and that mild cases of the disease might have gone unnoticed or have been confused with more benign conditions, it appeared that there might be patients in mental hospitals as a result

of W.E.E. in whom the primary cause had not been suspected. This possibility seemed further strengthened since as already mentioned, the secondary condition in adults may be so delayed that the association might not be realized. Having this in mind, arrangements were made to test patients in the two mental hospitals in the Province, one of which is located at Battleford in the north, and the other in the south at Weyburn.

Patient	Year disease contracted	Doctor's remarks
C.M.	1947	In the past two years this man has been confined off and on in the Weyburn Mental Hospital and has received shock treatment for schizophrenia.
M.K.	1942	Acts like early post Parkinsonian.
N.N.	1943	Post Parkinsonian definite and of such severe proportion that he was forced to resign three years ago as a parts man in an implement shop.
J.T.	1942	Had definite mental retardation for a year prior to death.
M.J.	1949	Had anxiety neurosis 1949—improved in 1950.
G.P.	1948	Mild personality change.
R.G. (child)	1941	Seen November 12, 1942—backward.
E.F. (child)	1942	Seen September 1949—epileptic seizures.
B.R. (child)	1941	Cerebral palsy.
L.S. (child)	1949	Cerebral agenesis—died.
H.P. (child)	1948	Cerebral palsy.
G.H. (child)	1948	Cerebral palsy.
D.B. (child)	1947	Mentally retarded.
Y.K. (child)	1947	Mental retardation.
W.S.	1947	This man was a farmer who worked hard and showed keen interest in district affairs prior to having had W.E.E. About two years ago he changed very markedly and ceased to be interested in his farm or people who had known him for years. At times his memory was very poor. Examined in September, 1951—was well nourished but not normal mentally. Died in October, 1951.

It should be stated that prior to the testing of patients at these hospitals, considerable work had been done to determine if many healthy individuals in the Province harboured neutralizing bodies for the equine virus. Results obtained from this survey showed that of 1,700 tests done one gave a slightly suspicious reaction, while all others were negative. These samples were collected in widely separated districts throughout the Province; some from areas where the disease had appeared epidemically; others came from areas where isolated cases had been diagnosed;

while others were secured from parts where W.E.E. had not been recognized. From these findings it appeared that a positive reaction would have significance and could be accepted as proof of infection with the equine virus.

Tests were first taken at the northern hospital at which time there were some 1,500 patients. As would be expected, ages covered an extensive range from about 20 to over 80 years. Some of the patients had been confined for thirty years or more while others had been recently admitted. At first it was planned to test only those showing symptoms which could have resulted from an encephalitis and where the duration of the illness was such that positive reactions to the equine virus could still be expected if such an infection had actually occurred. As the work progressed however, it was decided to test all the patients in the hospital and to take into consideration the length of time the patient had been confined, which would be a factor in determining whether or not neutralizing bodies could be expected in the blood in measurable amounts. It is true that the length of time neutralizing bodies remain in the blood is quite variable, and to some extent limits the scope of work of this nature. We find that it is not at all uncommon to secure a strong positive reaction six years or more after recovery from W.E.E. In one case where there were no ill effects following an attack of the disease a strong positive reaction was obtained twelve years after recovery. The neutralizing titre of the blood in this case has not changed markedly since the first time a test was made. This is perhaps an unusual case, at least in our experience it is the longest time over which neutralizing antibodies have persisted after known infection.

In view of these facts, and considering that W.E.E. was first recognized in Saskatchewan some fourteen years prior to the commencement of this study, it seemed reasonable to expect some positive reactions would be secured if the equine virus had played any part in the patient's mental condition. It has been noted during the course of this work that there is, in most cases, an inverse relationship between the duration of the mental illness and the neutralizing quality of the blood. Patients who have been ill for a number of years more often give a weak positive or partial reaction while the blood from more recent admissions is usually quite high in neutralizing qualities.

The work commenced at the Battleford Hospital in January, 1950 and carried on until April, 1951 and over 1,500 tests were made. Some patients had been in the institution since 1914, others being admitted each year from that time until the present. All those tested who had been admitted to the hospital between 1914 and 1932 proved negative while of those admitted in 1933, one gave a reaction which was suggestive of having been infected with the equine virus. Two patients hospitalized in 1942 gave incomplete results, as did one of the 1947 group together with two admitted in 1949. Twelve of the 1,500 or 0.08% gave very strong positive reactions proving definitely they had been infected with the virus of W.E.E. These patients were admitted as follows: one in 1937, one in 1942, one in 1946, two in 1947, one in 1949, two in 1950, and four among patients admitted between January 1 and March 31, 1951, when the general testing at the Battleford Hospital was completed. The high percentage of positive cases located in the early months of 1951 stimulated a further interest in the matter and since the authorities at the hospital were keenly interested in the results secured throughout, they suggested that the work be continued testing all new patients on arrival. This plan was agreed upon, and from April 1, 1951 until October 10, 1952, 619 examinations were made, fifteen or 2.42% of which proved positive while three or 0.48% were classified as incomplete or suspicious.

Turning our attention to the Weyburn Hospital we found conditions much the same as at Battleford. Many of the patients had been hospitalized for such a long period of time that positive reactions could not be expected even though they had been infected with the equine virus prior to admission. Further, many of the early patients had been confined to hospital before W.E.E. had been recognized in the Province and any cases which might have developed after admission would most certainly have been recognized. Considering these facts, and realizing that negative results were obtained at Battleford with patients who had been confined prior to 1933 it was decided to examine only those who had been admitted after W.E.E. had appeared in the Province. In this group there were 189 on which neutralization tests were carried out. Nine or 4.76% proved positive while one gave a suspicious reaction. The high percentage of positive cases located at Weyburn is not surprising, since,

as already stated, the patients considered were only those who had been hospitalized after W.E.E. became common in the Province. It should be also stated that the disease was first recognized in the Weyburn area and it has been the centre of outbreaks occurring in the Province since that time. At a later date a number of the early admitted patients were tested at the institution and, as at Battleford, only negative reactions were obtained. It will be noted that the majority of positive cases located at both institutions were among the more recent admissions. At Battleford, of 27 positives six were among those hospitalized between the years 1937 and 1947; while 19 were admitted during 1950, 1951 and up until October 1952. Of the nine positive cases at Weyburn three were admitted between 1942 and 1949 and six during 1950 and 1951.

It is difficult to interpret the significance of the high incidence of positives among the more recent admissions. There had been no outbreak of epidemic proportions among humans since 1947.

Two factors add to the difficulty. One, the long interval that may elapse between the primary infection and the onset of mental symptoms in adults. The other, the gradual character of the onset. The importance of this is drawn in the following table:

Patient	Positive W.E.E.	Appearance of mental symptoms	Hospitalized
J.S.	1948	1949	1949
J.M.	1944	1947	1949
W.	1941	1944	1945(died)
R.F.	1946	1948	1950

Because of this inconsistency of time elapsing between infection with the equine virus and the appearance of the mental symptoms, these positive cases cannot be associated with any particular outbreak of the disease. It is of interest to note, however, that of the 15 cases located at the Battleford hospital between 1950 and 1952 12 came from districts where the 1947 outbreak was quite severe. It is perhaps of further interest that prior to 1947 W.E.E. had never been reported from the municipalities in which these patients had resided. With regard to the nine positive cases located at Weyburn it is noted that all of these people came from districts where W.E.E. had appeared epidemically since the disease was first recognized

in Saskatchewan. It would therefore be quite impossible to even hazard a guess as to when the primary infection occurred.

Not only has it been shown that mental derangement may follow infection with the virus of W.E.E. but according to Ayres and Feemster¹ the same condition may result after an encephalitis caused by the virus of eastern equine encephalomyelitis. These workers stated, "After the 1938 outbreak of eastern equine encephalomyelitis in southern Massachusetts, 34 persons were infected, 70% being under ten years of age; nine survived and six had permanent sequelæ after one year. One of the nine survivors cannot be located; two of the eight other survivors had died; four are hemiplegic, mentally deficient and emotionally unstable; one is mentally deficient, epileptic and hysterically inclined; one has a slight Friedreich's foot and is a habit problem; only one has made an apparently complete recovery."

Though there are many points still to be explained, these findings bear out the suggestion that not only do recognized cases of W.E.E. tend to undergo mental deterioration requiring detention in mental institutions but there are in our mental hospitals a considerable number of cases in which the mental breakdown can reasonably be attributed to a previous but undiagnosed infection with the equine virus.

SUMMARY

A disease considered as non-paralytic poliomyelitis appeared in Saskatchewan in 1935 becoming more prevalent each year until 1938 when it assumed epidemic proportions. Since many of the cases that year were in areas which were free from poliomyelitis it was decided to study the condition with a view to determining the causative agent.

During the summer of 1939 it was proved that the disease was in reality W.E.E., the virus being isolated that year from two typical cases.

As the study progressed it was observed that young infants after recovering from the acute condition, in many instances failed to develop mentally while older children showed an early mental deterioration.

It was later found that some adults became mentally ill after having suffered from the virus disease, the symptoms appearing a year or more after the primary infection.

These findings suggested that there might be patients in our mental hospitals as a result of infection with the equine virus but the primary cause not suspected.

Arrangements were made to test patients at the two mental hospitals in the Province with the result that at one institution 27 positive and six suspicious cases were located. At the other hospital nine positive reactions were obtained while one gave an incomplete or suspicious result.

The co-operation of Dr. U. Gareau of Regina who first drew attention to mental changes in children is appreciated.

We are indebted to Dr. M. DeMay, assistant superintendent of the Saskatchewan Hospital at Battleford, for his interest and assistance when testing patients at that institution. Note: a grant from the Dominion-Provincial Public Health Research Fund made this work possible.

REFERENCE

1. AYERS, J. C. AND FEEMSTER, R. F.: *New England J. Med.*, 240: 960, 1949; (Abst. in *Vet. Bull.*, 20: 360, 1950).

PRIMARY PERITONITIS

JOE A. RYAN, M.D., C.M., A.I.C.S.,
Renfrew, Ont.

IDIOPATHIC cryptogenic or primary peritonitis, long recognized as a clinical and pathological entity is only infrequently considered in surgical journals. Maingot and others remind us that "primary" is the term given to those cases of peritonitis in which no obvious intra-abdominal cause is found, and which are in fact secondary in nature, as the infecting organisms are brought to the peritoneum from some distant focus by the blood or lymph channels or even the female genital tract.

Before the advent of chemotherapy the prognosis was bad, the fatality rate averaging about 76% (Budde) (Barrington-Ward). With the antibiotics available today, plus early diagnosis and proper treatment, deaths should be practically nil from this affliction.

Here follows a case report from the Southend General Hospital, Essex, England, in 1952.

A 41 year old multipara was brought by ambulance to hospital at 4.35 p.m. complaining of severe abdominal pain. I visited her about 12 minutes after her admission to the ward.

The family history was unremarkable; patient's past illnesses were limited to an appendectomy several years before with no sequelae.

The present sickness had begun that morning; while on a holiday at the sea front she was seized with pain in her lower abdomen which had spread and become excruciatingly constant since then. There was no vomiting, no bowel or bladder disturbances.

Her last normal period was completed 2 days before; she didn't think pregnancy was at all probable. She had been perfectly well the previous day.

She lay with legs flexed, moaning and occasionally writhing about. Her expression was anxious, the face flushed, forehead covered with cold perspiration, tongue moist but slightly furred. The pulse was 83, respirations 21, mostly thoracic but the diaphragm had some movement. B.P. 135/80.

The important findings were in the abdomen. There was no distension nor retraction in its lower half. It was exquisitely tender everywhere. There seemed to be more rigidity just above the pubes but the entire musculature was practically boardlike. Rebound tenderness was worse in the lower half of the abdomen. Percussion revealed no abnormal resonance or tympanitic sounds and auscultation suggested no outstanding diminution of intestinal sounds.

Digital vaginal examination produced nothing conclusive—only the same generalized pain on bimanual. Dark red blood on the glove, made me suspect the possibility of ectopic, albeit the patient's history was almost a denial of it. Rectal examination otherwise was negative.

Red cell count was within normal limits; urinalysis negative (catheter specimen) and white cells up to 11,700.

The pain did not alter in degree when the patient sat up nor was there any periumbilical blueness of the skin as sometimes occurs in acute pancreatitis; the patient had no history of digestive upsets, making stomach or gall bladder perforation a bit remote. A pertinent point in the recent history was her eating of shrimps, mussels, cockles and jellied eels the day previous to admission, but the pulse was too fast and the onset too sudden for typhoid.

The gynaecology consultant reported: (1) that the cervix did not appear pregnant; (2) that the reproductive organs were probably quite normal; (3) that he could not support a tentative diagnosis of ectopic gestation.

In view of the doubt as to the nature and origin of the peritonitis, laparotomy was performed through a right paramedian incision. The naked eye findings of the extra-peritoneal tissues were negligible. On opening the peritoneum, however, there exuded about four ounces of somewhat watery but slightly purulent yellowish gray odourless fluid, which unfortunately immediately found its way into the waiting suction apparatus and was never recovered for bacteriological study. No more fluid was found either free or isolated in the abdominal cavity.

The subsequent exploration revealed the absence of the appendix and the following structures were normal: large and small bowel, liver and biliary system, stomach and duodenum, kidneys, bladder and ureters, uterus and adnexa; the posterior abdominal wall was free of inflammation, pus pockets and neoplasms. In short we had a case of acute diffusing primary peritonitis. The peritoneum itself at the site of entry had lost its natural sheen and a surrounding area of about 20 centimetres was injected but the frosted appearance had not yet become striking.

Closure was effected in layers without drainage. (In my humble opinion drainage is overdone today; generally speaking there has not been a diminution of this practice commensurate with our advances in anti-infection measures.)

The patient was remarkably free from pain in a short time, was up the following day and made a rapid recovery, penicillin and streptomycin being discontinued after the 4th day. She was transferred to a convalescent home on the 5th day and returned to her residence on the 8th. She has been well these past ten months.

On this topic Mr. Norman C. Tanner, Senior Surgeon at St. James' Hospital, London writes: "Occasionally we see cases of peritonitis for which no obvious cause was found, though I would consider them rare and usually relatively benign. Apart from the mild cases of serous effusion due to lymphadenitis, enteritis or torsion of an appendix epiploica, I think the majority are due to recent or old perforations of the intestinal canal, also by rupture of a colonic diverticulum, or temporary perforation by a foreign body. We get two to three foreign body perforations of the colon every year, usually fish bone, rabbit bone, or occasionally, impaction of a plum-stone in a diverticulum; rarely, swallowed needles."

A revealing survey on primary peritonitis in the *Royal Hospital for Sick Children*, Edinburgh came to me from the chief surgeon, Mr. J. J. Mason Brown: "During the ten-year period, April 1, 1929, to March 31, 1939, 32 cases of primary peritonitis were admitted to one ward of the Children's Hospital. Of these, 20 were streptococcal, 11 pneumococcal and 1 staphylococcal. Out of the 20 streptococcal cases 16 died; 4 of the 11 pneumococcal; and the case of staphylococcal peritonitis also died—making 21 deaths out of 32 consecutive cases, a total mortality rate of 65.5%.

"Since January 1, 1948, *i.e.*, a period of five years, there have only been 12 cases of primary peritonitis admitted to the hospital. Of these, 5 were pneumococcal, 1 streptococcal. In 2 cases the only organism recovered was *B. coli*: although there was no evidence of lesion in the alimentary tract, I think that these two should probably be discarded. In the remaining four, the purulent fluid contained pus cells, but was sterile on culture, probably due to previous antibiotic therapy. There were no deaths in this series of cases. There is no doubt that the incidence of primary peritonitis has gone down dramatically and I believe that with organisms sensitive to antibiotics there is unlikely to be any mortality."

Dr. Richard H. Sweet of Boston admits his experience with so-called idiopathic peritonitis has not been vast and believes the condition was

talked about much more 20 or more years ago than now. Looking back over his abdominal surgery experience he says that it is not only unusual but that the cases formerly called idiopathic peritonitis were almost always in women or girls, arising primarily in infections of the tubes of a non-gonorrhoeal nature. He concludes: "In other words, like so many conditions which have been dubbed idiopathic, sooner or later the term is dropped as the true nature of the situation is understood."

From his institution in Edmonton, Alberta, Dr. Walter C. MacKenzie Surgeon in Chief, writes: "Primary peritonitis is a very rare clinical entity in the West. Most of the lesions we see here are certainly secondary to diseases of organs contained in or adjacent to the peritoneal cavity. The only case that comes into this category in the University Hospital since the war was that of a Professor of Psychology. He presented with vague abdominal pain and vague abdominal findings and only after 36 hours demonstrated enough in the way of abdominal findings, to warrant exploration. At the time of exploring his peritoneal cavity it contained considerable murky fluid and a very careful search of the abdominal viscera revealed no definite etiological site. His appendix demonstrated periappendicitis and contained a fecolith but certainly was not ruptured nor did it appear to be a source of his peritonitis. Cultures of the peritoneal fluid and blood revealed hæmolytic streptococcus and he responded well to antibiotic therapy."

My gratitude is due to the surgeons listed below and to Professor Sir James Learmonth, K.C.V.O., C.B.E., Chief of Edinburgh's Department of Surgery who secured for me the pertinent statistics of Mr. Brown. The willing assistance of these gentlemen made this paper possible.

REFERENCES

1. BROWN, J. J. M.: Personal communication.
2. MACKENZIE, J. W.: Personal communication.
3. MAINGOT, R.: *Abdominal Operations*, 2nd ed., Appleton-Century-Crofts, Inc., New York, 1948.
4. SWEET, R. H.: Personal communication.
5. TANNER, N. C.: Personal communication.

Writing, if not a lost art, seems at times to be a losing one. If editors have any function (and I would not disagree entirely with those who doubt it) it is that of trying to persuade authors that there is no good writing, only good rewriting,—that what is worth setting down at all can be done twice as well in half the number of words—only it takes twice as long to do it. Original writing, like tapping a maple tree, is tedious business, but the really slow work, and the hard sugar, come in the boiling down of the sap.—Jos. Garland, *New England J. Med.*, 246: 801, 1952.

TREACHER COLLINS
SYNDROMEJ. SZLAZAK, M.D., *Regina, Sask.*

SINCE BARRY IN 1888 mentioned his two cases with the abnormality of the eyelid in the form of notching, and Treacher Collins in 1900 published his case giving a more accurate description of deformities of the eyelid and malar bones, almost every year since 1943 there have been publications in the medical literature of cases of this syndrome. In England and on the American continent this abnormality is described as the "Treacher Collins syndrome" and on the European Continent as "Mandibulo-facial dysostosis" or "Franceschetti syndrome." There is, however, no question that all credit should go to Treacher Collins.

The Treacher Collins syndrome is a congenital deformity mainly of the face, and frequently of other parts of the body. In my opinion it is not so rare as the authors publishing these cases thought, because, apart from the fully developed, there is a considerable number of abortive cases which are less noticeable and are not recognized.

Etiology.—The etiology of this syndrome, as in other congenital deformities, is obscure. Ida Mann, in 1943, mentioned that a disturbance of division and development of the mesodermal bone tissue at the time of the fifth week of fetal life probably initiates this syndrome. Straight mentioned that this syndrome is seen mostly among the poorer class of people. Barry reported this syndrome in two of his cases, a mother and daughter; Straight found five cases in one family; Harrison two cases. These authors as well as the writer are all of the opinion that the hereditary factor plays an important rôle in this syndrome. Some authors suspect the transmission is through the female line. Case 2 in this article shows also that the syndrome may exist in multiple pregnancy, when the developmental factor handicaps growth of one fetus.

Signs of the syndrome.—All of the published cases show clearly that most signs of this syndrome are attached to deformities of the face. In addition, when the cases are carefully studied, maldevelopment in other structures of the body can be detected quite frequently. Gayral suggests that in some, where the signs of this syndrome are not very pronounced, diagnostic x-ray examination is very helpful. In his opinion the

abnormal disproportion in development of the facial bones in Treacher Collins Syndrome is characterized by a lack of marked naso-frontal angulation with prognathic maxilla and hypoplastic mandible, which in the lateral view gives a picture of the "profile of the head of a fish."

In fetal life the head develops more markedly in proportion to other parts of the body, and it is possible that this is the reason that this deformity affects the head more than other structures of the body. In my opinion the maldevelopment of



the face is characterized by a peculiar disproportion, namely the bones growing in the vertical direction are hyperplastic and those growing in the transverse direction are hypoplastic.

From careful observation it is noticed also that some ectodermal elements of the head are maldeveloped; such as external auditory meatus, nares, mouth, interpallebral spaces and the growth of hair on the cheeks. It is difficult to decide whether this ectodermal malformation is primary or secondary to the mesodermal deviation.

THE MAIN SIGNS OF THE SYNDROME

1. *Skeleton.*

(a) *Skull.*—Square forehead, flattening of the occipito-parietal region, lack of angulation in the naso-frontal region and long occipito-frontal diameter, asymmetry of the skull caused by mal-development of the internal structure of the skull, such as the petrosal bone.

(b) *Facial bones.*—(1) Malars underdeveloped with small ridges. (2) Lack of zygomatic arch. (3) Small antra and in some cases antra disproportionally large to the small malar bones. (4) Absence or occlusion of auditory meatus. (5) Hypertrophic nasal septum. (6) Hypertrophic maxillary arch. (7) Frequently a highly arched palate, which may be associated with cleft palate.

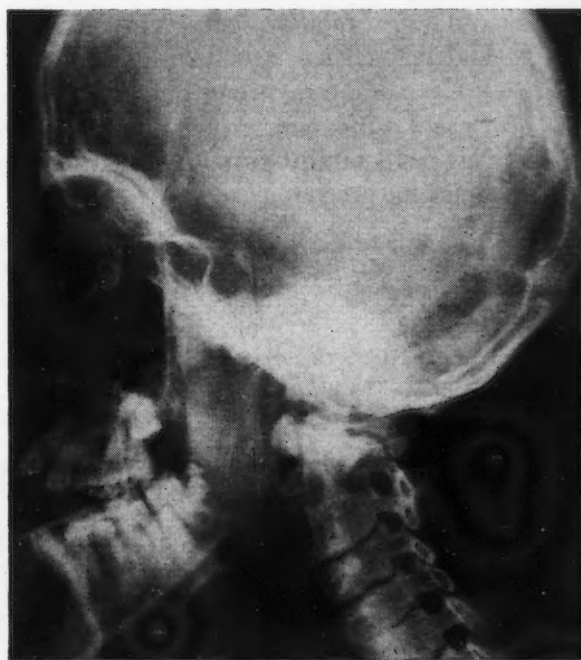


Fig. 4

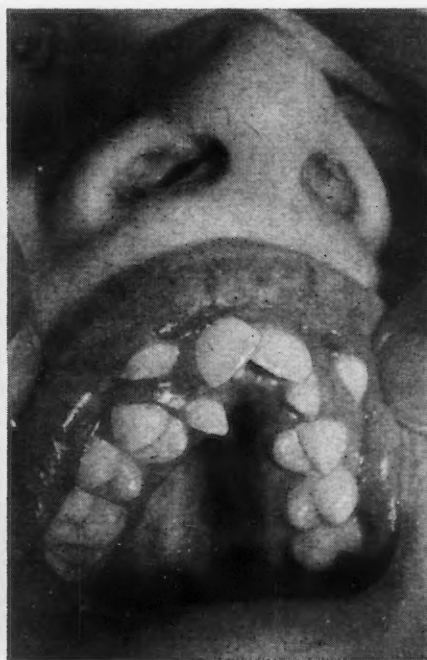


Fig. 5

(8) Malgrowing teeth. (9) Mandible hypoplastic, retruded, with angle of the jaw obtuse which frequently gives an open bite.

(c) *Others.*—Some cases have been observed with such abnormalities as fused cervical vertebrae, abnormal costo-sternal structure, such as pectus excavatus, long metacarpal and metatarsal bones.

2. *Eye.*—Narrow interpalpebral spaces most frequently running obliquely laterally, but occasionally medially. Notching on the outer portion of the lower eyelid mostly, and occasionally on the upper eyelid. The eyelashes are absent or growing irregularly in two or three rows. Hypertrophy of the Meibomian glands.

Absence of lacrimal glands. Lateral deviation or protrusion of the eyeball. Congenital ptosis.

3. *Ears.*—Congenital absence of the external ear, deformity of the ear, with deafness or partial deafness.

4. *Mouth.*—In the majority of cases there is macrostomia and in some cases microstomia. Occasionally undeveloped tongue.

5. Atresia of pharyngeal ring.

6. *Cheeks.*—Blind fistulae on the cheeks, and occasionally characteristic "tongue-shaped" growth of hair on the cheeks on the lateral side of the face.

7. *Nose.*—In the majority of cases it is big with a very short columella, narrow nares and small lateral cartilages.

8. *Associated deformities.*—Hypermobility of the phalanges.

9. *Mental development.*—Most cases in this respect are normal, but in the author's one case there was slight retardation.

PRESENTATION OF CASES

CASE 1

Patient was sent by the Rehabilitation Unit for plastic repair. The family history showed that the grandmother had typical signs of the Treacher Collins Syndrome. She had five children, four girls and one boy and of these, three girls and the boy have the syndrome and one girl is normal. All these children married but only one girl, mother of this patient with the syndrome, had children. In her family there were six children, three normal and three with the syndrome. One with the syndrome died in childhood.

Fig. 1 shows the mother with two children with the syndrome. The boy, as shown in Figs. 2 and 3, has the typical Treacher Collins Syndrome with undeveloped malars, notches in the right upper lid, deformity of the ears, very long hooked nose, microstoma and hair whiskers on the cheeks. The palpebral fissures are lying slightly obliquely medially. The eyelashes are present, but they are growing in two or three rows. Fig. 4 of the x-rays shows the shape of the skull, the small malars and obtuse jaw with open bite. There is lack of angulation in the fronto-nasal junction, disproportionally large antra and fusion of the second and third cervical vertebrae. The highly arched palate with displacement of the upper

fronto-nasal angulation, large nose, undeveloped malars, microstoma, retruded jaw, malformation of the ears. The other child was normal, and there is no history of Treacher Collins Syndrome in the family.

CASE 3 (FIG. 8)

This is a typical case of Treacher Collins Syndrome with hypoplastic malars, interpalpebral fissura running obliquely laterally, lack of eyelashes on the middle two-thirds of the lower eyelid, retrusion of the jaw, disproportionally large nose, and lack of fronto-nasal angulation. He also has some deformity of the external ears. Apart from these malformations he has undescended testicles.

SUMMARY

The author has reviewed the cases of Treacher Collins syndrome published previously in the medical literature, and has presented three new cases collected in two and a half years' practice in Saskatchewan (population 800,000). This congenital deformity, which is not as rare as generally thought, affects mostly mesodermal and ectodermal structures of the head.

Case 1 shows strong hereditary incident, and Case 2 adds more explanation to the etiology of this congenital deformity which may develop in multiple pregnancy.

I am indebted to Dr. J. D. Stephen for access to Case 2 and to Mr. H. Wood, of Regina General Hospital, for photographic records.

BIBLIOGRAPHY

1. BARRY, A. G.: *Ophth. Hosp. Rep.*, 12: 225, 1888.
2. COLLINS, T.: *Tr. Ophth. Soc.*, 20: 90, 1900.
3. MANN, I. AND KILNER, T. P.: *Brit. J. Ophth.*, 27: 13, 1943.

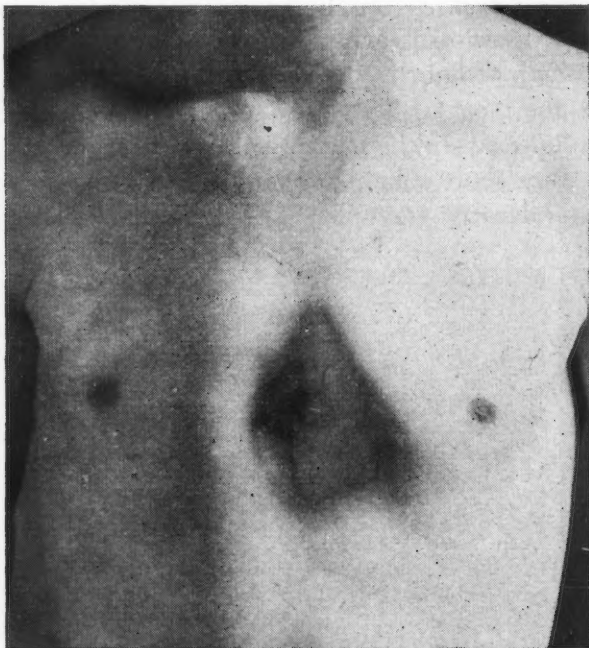


Fig. 6



Fig. 7

alveolus to the midline and irregular, poorly growing teeth, is shown in Fig. 5. Fig. 6 illustrates deformity of the chest.

CASE 2 (FIG. 7)

Newborn, from a twin pregnancy, died a few hours after birth. It showed typical signs of Treacher Collins Syndrome with profile of "the head of a fish," lack of



Fig. 8

4. FRANCESCHETTI, A. AND ZWALLEN, P.: *Bull. Schweiz. Akad. d. med. Wissensch.*, 1: 60, 1944.
5. FRANCESCHETTI, A. AND KLEIN, D.: *Acta Ophth. Univ. of Geneva*, 27: 143-224, 1947.
6. STRAITH, C. L. AND LEWIS, J. R.: *Plastic and Reconstr. Surg.*, 4: 209, 1949.
7. GAYRAL, BRU AND PAINTRAUOVE: *Journal de Radiologie et D'Electrologie Tome*, 31: No. 1-2, 97, 1950.
8. HARRISON, S. H.: *Brit. J. Plastic Surg.*, 3: 282, 1951.
9. O'CONNOR, G. B. AND CONWAY, M. E.: *J. Internat. Col. Surg.*, 17: 714, 1952.

HOW THE DERMATOLOGIST CAN HELP IN INDUSTRY*

GIBSON E. CRAIG, M.D., *Montreal*

SINCE THE TURN of the century, Canada has become more and more industrialized. In that time, our urban population has increased from 40 to 60% of the total. This, of course, means that more and more men and women are working in industry and less in outlying areas. Such shifts in population make for changes in medical problems, and so in Canada today we find more and more physicians doing whole or part-time work in industry.

Dermatological problems are said to constitute 10 to 15% of general practice, but in industry the incidence of skin disease is much higher and in some factories represents the major medical problem. Schwartz and Tulipan, in their standard textbook on the subject, claim that 1% of the workers in the U.S.A. suffer from occupational dermatoses.

Andrews says that 65% of all occupational diseases are dermatoses while Horner, reporting on the incidence of industrial skin disease in England, says that "Inflammation of the skin caused by irritants met with in industry has accounted for most of the compensable disease in Great Britain, if certain conditions mainly confined to miners is excluded".

An accurate estimate of the incidence in Canada is difficult to obtain. The Department of Health and Welfare says that, "Broadly speaking, it is estimated that about 1% of industrial workers are annually affected with occupational dermatoses and 60 to 70% of all cases of occupational disease are dermatoses".

Schwartz claims that the average case of dermatitis is compensated for ten weeks. If our average is the same in Canada,—and our figures bear them out fairly well—then the cost of industrial dermatitis in Canada is extremely high. The U.S. Public Health Service estimated the cost of such cases in the U.S.A. at \$100,000,000 a year.

This problem, therefore, should be of interest not only to dermatologists, but to everyone interested in industry and economy.

Twenty months ago, we began a weekly half-day skin clinic at Canadair Limited with the

three-fold purpose of: (1) Treating cases that presented themselves. (2) Investigating conditions in the plant so that hazards could be eliminated. (3) Determining for management if specialized dermatological help was warranted.

TYPE OF WORK

The airplane consists essentially of a chassis or frame-work around which is built the fuselage and to this is attached the wings, controls and motor.

The fuselage is made of sheets of duraluminum called Dural. The sheets of metal are molded into proper shape by presses or by hand and the parts riveted or welded together. In some planes, wings and controls are covered with an impervious application of dope which consists of cellulose acetate or nitrate dissolved in a solvent such as acetone. Aluminium sheets are often covered with a heavy oil called fish oil.

Together with the large departments which make parts and assemble there are smaller sections, such as plastics department, paint shops, heat treatment rooms, etc. Each of these have their own individual hazards, and some knowledge of the work done in each is essential to a proper handling of the situation.

In the last twenty months, we have seen approximately 1,000 different patients. Their total attendance at the clinic was 2,046, making an average number of calls per patient slightly over 2. This is approximately the same as in our private office and somewhat lower than that at the Royal Victoria Hospital clinic, suggesting that employees did not come more often than was necessary and that the rate of cure was satisfactory; 38 of the 1,000 cases came with two different diseases and four with three or more.

The number of patients seen each Tuesday morning has averaged between 25 and 30. With such a large number, it is not possible to make many tests. We have done a few biopsies where malignancy was suspected, and taken cultures on stubborn infections, but largely the diagnoses are based on clinical appearance alone.

The largest number of cases fall into what we call the papulo-pustular group including folliculitis, acne, boils and rosacea. There were 232 cases or 23% in this group. Folliculitis was found mostly on the face, forearms and upper legs, and was to a large degree produced by oil. In sections where lathes are operated, the workers are sprayed with a fine film of cutting so that

*Paper delivered to the Canadian Dermatological Assoc., June, 1953.

their exposed skin becomes covered and their clothes become saturated with it. Such contact with oil can produce folliculitis or it can be produced by harsh methods of cleansing. Soap provided by the company was found to have a pH of 9.5 and, when this does not clean, other substances such as cleaners containing grit or solvents are often used. Cleanliness is essential in controlling folliculitis. We have found that the use of a mild detergent, such as Cetavlon is useful, as it removes grease and oil without irritation. The workers are also instructed to bathe often and either change oily clothes frequently or wear protective aprons while at work.

The number of acne cases was large, as would be expected in a plant where the personnel is young. We could not find any relationship between the incidence of acne and the type of work done.

Boils frequently occurred in patients with folliculitis or where irritation was a factor. There were no constitutional causes found for boils and usually they cleared up promptly if the skin was kept clean and irritants, especially adhesive plaster, were removed. A few cases were given staph toxoid but this was far from routine.

Contact dermatitis, which we believed would represent a large percentage of cases, has not been great. There were 21 cases of primary irritant contact dermatitis, all but one due to using depressors and thinners. These solvents are used both to clean parts and also for cleansing the skin. Their continual use produced dry, cracked skin which is easily infected. It should be stressed in all plants that solvents are harmful to the skin and predispose to trouble.

Allergic contact dermatitis was diagnosed in 85 cases and, much to our surprise, three times as many were caused by substances contacted at home and at play as were caused by substances contacted at work. It is probable that most mistakes in industrial dermatology are in this group. Almost without exception, workers presenting themselves with eruptions suggest that it is due to their work and, unless the cause can be ascertained with reasonable certainty, the worker is annoyed if he is not put on compensation. In this group were 27 cases of poison ivy, 6 from nickel jewellery, 3 from matches, and other miscellaneous things, as ointments, after shaves, etc.

Cases of allergic contact dermatitis of industrial origin were sporadic and not confined to

any one department, although, as expected, a few were from the paint shop.

As soon as a contact dermatitis was diagnosed, the person was given immediate protection, such as bandages or gloves. When the skin healed, Barries creams, such as Kerodex, were advised. Barries creams have been used successfully in protecting workers against irritants and also where work is dirty and harsh substances are necessary to cleanse the skin. Not all Barries creams have the same protective qualities, and it is necessary to have the specific type suitable for each job. If, after a reasonable period, the patient does not improve with protection, he is transferred to another job. In this part of the work we have been fortunate in having the help and co-operation of the safety engineers, who investigate all cases which we cannot see and facilitate changes of job where necessary. It is essential that such job changes be recorded so that the worker is not transferred to the first department at a later date.

Fungus infections totalled 107 cases. There were 68 cases on the feet, 22 of which had the interdigital "id" reaction on the hands. These cases can be confused easily with hyperhidrosis or contact dermatitis and, unless the feet are examined and treated, it is useless to treat the hands. Over-treatment of such hands with subsequent absorption and dissemination can turn a relatively simple case into a very complicated one.

The papulo-squamous diseases occurred in about the proportion that would be expected. Psoriasis in 25 cases, lichen planus in 4, pityriasis rosea in 16 and seborrhœic dermatitis in 58. Many of the latter had little more than mild scaling of the scalp. Some were associated with external otitis.

New growth of the skin represented 11% of the total. There were 2 basal cell carcinomas, squamous cell carcinoma and a few seborrhœic keratoses but the large majority were common warts. The number of cases was too small to draw any definite conclusions, but it would appear that warts occur more commonly in departments where minor cuts and abrasions are common. If such could be proved, it might place warts among the compensable diseases. Warts were treated by curetting under local anaesthesia. This method is we felt superior to electro-surgery, carbon dioxide snow or x-ray. The same

method was used for warts occurring on the plantar surface of the foot.

Parasites accounted for 23 cases including scabies, pediculosis and capitis, flea, mosquito and bed bug bites. The above were not always easy to diagnose. A number of Englishmen, who had never seen mosquitoes prior to last summer, reported with bullæ as large as hens' eggs from such bites. One man reported three times with a generalized pruritus which he claimed was due to Dural. I was at a loss to make a diagnosis until the nurse slapped a bed bug off his coat on to the desk.

There were 25 cases of herpetiform lesions, 13 of zoster and 12 of simplex. Urticaria was seen in 26 cases mostly due to penicillin. There was a long list of miscellaneous conditions too varied to classify, such as xanthoma, callosities, foreign bodies, ichthyosis, etc.

RESULTS

We have estimated our results by comparing the twenty months under review with the twenty months prior to this period.

In the first period, September 1, 1949, to April 30, 1951, the employed population averaged 4,217. In this period 24 skin cases were compensated for 1,337 days at a cost to compensation of \$9,015.31. In the second period, May 1, 1951, to December 31, 1952, with an employed popula-

tion of 10,838, five cases were compensated for 98 days at a cost to compensation of \$648.44. Safety men estimate that the indirect cost of a compensation case, including time lost to company, investigation, etc., is 4 times the actual cost.

If we have been successful in this survey, it has been due to:

1. Adequate clinic space with well-trained, co-operative nurses and first-aid men.

2. Elimination of known irritants from the treatment shelf and the adoption of substances having a low incidence of sensitization, such as Neo-Mycin and Vioform.

3. The co-operation of the safety engineer and supervisors who urged early reporting of cases.

4. Early diagnosis so that non-industrial dermatoses and industrial dermatoses were not confused.

5. Removal of the worker from irritants before he became incapacitated.

6. The use of protective gloves, aprons, Barriers creams, etc., where indicated.

CONCLUSION

I believe it is fair to say that there is a place for dermatologists in industry and that the incidence of skin disease would be reduced and considerable savings made if they were used more widely in this work.

HÆMORRHAGE IN ANTICOAGULANT THERAPY*

R. L. MACMILLAN, M.D., M.R.C.P.,
F.R.C.P.[C.], and
K. W. G. BROWN, M.D., F.R.C.P.[C.],†
Toronto

ANTICOAGULANT THERAPY will always carry with it a risk of bleeding but it is hoped that the danger may be minimized in the future by newer anti-coagulants and increased experience in their use.

This report is concerned with the hæmorrhagic complications of anticoagulant therapy at the Toronto General Hospital during the past two years. Four different anticoagulants were used:

*From the Department of Medicine, University of Toronto, and the Medical Service, Toronto General Hospital.
†Canadian Life Insurance Medical Fellow.

intramuscular heparin (10,000 units per c.c.) and dicoumarol, phenylindanedione and cyclocumarol. The concentration of heparin used was ten times that of the usual heparin preparation for intravenous administration. It did not contain gelatine or vasoconstrictors which other workers have employed to delay absorption. The usual dose of heparin was 150 milligrams (1.5 c.c.) and this was injected into the gluteal muscles every twelve hours. Maximal prolongation of the clotting time occurred in three to four hours, with a return to normal clotting time in eight to ten hours. A three-tube modification of the Lee-White method was employed to estimate clotting times. Dosage of heparin was altered to maintain the clotting time at two to three times the normal value four hours after the morning dose. In preliminary studies it was

found that shorter intervals between injections of heparin made control more difficult, with frequent excessive prolongation of clotting time. For this reason heparin was given every twelve hours; the normal clotting time for approximately two hours before the next dose provided a safety factor. The other anticoagulants were given by mouth and acted as prothrombin de-

pressants. Of these dicoumarol was the best known and most widely used; it had been isolated from spoiled sweet clover by Link and co-workers,¹ and clinical experience had already demonstrated the hazards associated with its use. It was included in this study to provide a basis for comparison. The other two oral anticoagulants were comparatively new drugs and lacked adequate clinical study. Phenylindanedione was introduced as an anticoagulant by French workers,^{2,3} and cyclocoumarol was one of a large number of dicoumarol derivatives prepared by Link. Preliminary trials on animals and humans suggested that it would cause satisfactory depression of the prothrombin level with only slight risk of bleeding.

Prothrombin estimations were carried out daily, with the exception of Sundays, by the Quick one-stage method. For each solution of

TABLE I.

INCIDENCE OF HÆMORRHAGE				
Treatment	Number of cases	Hæmorrhagic complications	Number of deaths	
Heparin.....	112	17	15.0	2
Dicoumarol.....	123	4	3.4	2
Phenylindanedione	133	0	0	0
Cyclocoumarol.....	121	7	5.8	1
Total.....	489	28	5.0	5

TABLE II.

HÆMORRHAGIC COMPLICATIONS IN 28 CASES						
Treatment	Patient	Sites of hæmorrhage	Thromboembolic disorder	Days on anti-coagulant	Clotting time, or prothrombin level	Remarks
Heparin:	D.C.	Operative incision	Pulmonary infarct	2	Therapeutic range	Incision resutured.
	A.T.	Hæmatoma: sites of injection	Myocardial infarct	10		Changed to phenylindanedione.
	F.C.	Hæmaturia	Venous thrombosis, right leg	2	" "	Stone in urinary bladder.
	G.S.	Rectal bleeding	Pulmonary infarct	5	" "	No lesion in bowel at autopsy.
	E.R.	Melæna	Pulmonary infarct	14	" "	Died five days after cessation of heparin: further pulmonary infarct.
	L.R.	Hæmatoma: sites of injection	Myocardial infarct	12	" "	
	C.F.	Hæmatoma: sites of injection	Pulmonary infarct	10	" "	Changed to dicoumarol
	*F.G.	Hæmorrhagic infarct of brain	Myocardial infarct	10	" "	Died: autopsy showed mesenteric emboli; gangrene of bowel.
	H.R.	Retroperitoneal hæmorrhage	Venous thrombosis, right leg	6	" "	Recovered without further complications.
	*C.W.	Hæmorrhagic infarct of brain	Venous thrombosis, left leg	15	" "	Died. Previous attack of cerebral thrombosis.
	D.L.	Hæmatoma: sites of injection	Myocardial infarct	7	" "	
	S.B.	Hæmatoma: sites of injection	Pulmonary infarct	19	" "	
	H.A.	Gross hæmaturia	Myocardial infarct	7	" "	Renal calculus demonstrated. Changed to phenylindanedione: no further bleeding.
	A.K.	Uterine bleeding	Pulmonary infarct	9	" "	Pulmonary infarct complicated septic abortion.
Dicoumarol	J.A.	Hæmatoma: sites of injection	Myocardial infarct	9	Clotting time excessively prolonged	Changed to dicoumarol: no further bleeding.
	N.I.	Lung	Myocardial infarct	9		See case report.
	E.R.	Brain	Myocardial infarct	11	Therapeutic range	Aphasia that improved slowly.
	E.S.	Bladder tumour	Venous thrombosis, right leg	4	24%	Vitamin K1 caused prompt cessation of bleeding.
Cyclocoumarol	*G.U.S.	Gastro-intestinal bleeding	Myocardial infarct	28	Less than 10%	Vitamin K1 corrected prothrombin level but patient died in shock the following day.
	J.H.	Gross hæmaturia	Myocardial infarct	5	9%	Vitamin K1 effective; dicoumarol continued with caution.
	*A.S.	Pericardial sac	Myocardial infarct	4	10%	Died. Autopsy: hæmopericardium, cardiac tamponade, no rupture of heart.
Cyclocoumarol	C.A.	Gastro-intestinal bleeding	Venous thrombosis, both legs	4	10%	Vitamin K1 effective promptly.
	M.L.	Gastro-intestinal bleeding	Myocardial infarct	6	42%	Possible carcinoma of stomach.
	*G.G.	Hæmorrhagic infarct of brain	Possible myocardial infarct	23	24%	Previous history of cerebral embolus.
	V.H.	Gross hæmaturia	Myocardial infarct	21	10%	Prompt response to Vitamin K1.
	F.S.	Rectal bleeding	Myocardial infarct	12	11%	Prompt response to Vitamin K1; later, found to have carcinoma of rectum.
	T.G.	Gross hæmaturia	Myocardial infarct	12	20%	
	M.H.	Gross hæmaturia	Myocardial infarct	14	10%	

*Deaths associated with bleeding.

thromboplastin a curve was prepared using different dilutions of normal plasma. The prothrombin content of the plasma being tested was read from the curve as a percentage of normal. A satisfactory therapeutic range for the oral anticoagulants was considered to be between 10 and 30% of the normal level.

The four drugs were assigned by random distribution to patients with thrombo-embolic disorders.

OBSERVATIONS

In the present series 489 patients received anticoagulant therapy (see Table I). Twenty-eight patients (5.7%) suffered bleeding that was

month the effusion slowly disappeared. It was felt that the bloody fluid denoted bleeding into the lesser fissure in a patient with pulmonary emphysema.

In this series bleeding did not occur in patients receiving phenylindanedione. However, in a group of 23 private patients who were treated with phenylindanedione, there were two instances of hæmatomas developing in operative incisions.⁵

DISCUSSION

The incidence of hæmorrhage was 5.7%. There were five deaths associated with bleeding and in at least two of these cases bleeding was the main factor causing death. In one patient

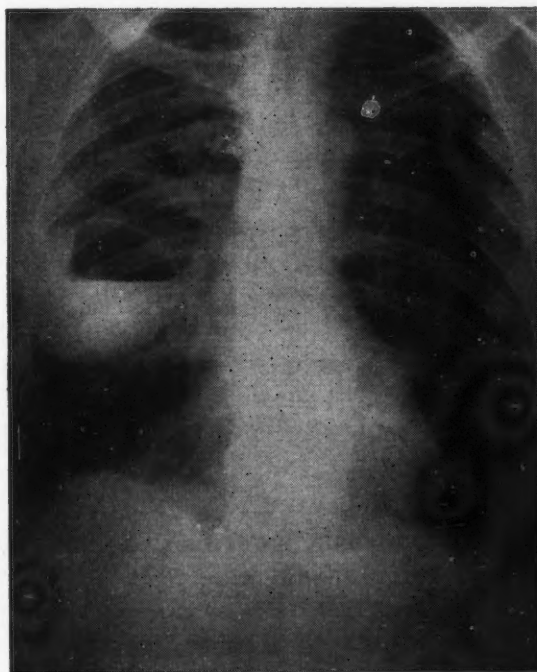


Fig. 1



Fig. 2

severe enough to require stopping the treatment (See Table II).

The following case is described in some detail because it illustrates bleeding into an unusual location:

N.I., an emphysematous 78 year old man, had a myocardial infarct. He was receiving 150 milligrams of heparin twice daily and clotting times were consistently within the therapeutic range. The clinical course was uneventful until the ninth day of treatment when he began to have right-sided pleural pain. A small amount of fluid bright red blood was coughed up, which differed from the mucoid sputum uniformly tinged with blood: a type of sputum that we consider to be characteristic of pulmonary infarction. The following day, however, radiological examination of the chest revealed a collection of fluid with an air-fluid level in the lesser fissure (Figs. 1 and 2). On aspiration bloody fluid was obtained. Heparin was discontinued and during the next

(G.U.S.) shock resulted from gastro-intestinal bleeding and despite blood transfusions and correction of the prothrombin deficiency by vitamin K₁ the patient failed to improve and died twenty-four hours after the hæmorrhage. In the other patient (A.S.) death occurred suddenly; at autopsy hæmopericardium was found without rupture of the heart. Hæmorrhagic infarcts of the brain were found in the other three fatal cases. In one of these (F.G.), the main cause of death was gangrene of the bowel resulting from multiple mesenteric emboli. In another patient (C.W.) a gastro-colic fistula had caused extreme debilitation and there was a history of a transient hemiplegia three months before death. The other patient (C.G.), who had chronic rheumatic

heart disease, suffered a cerebral embolus one year before death. In these patients hæmorrhagic infarcts of the brain probably hastened death. This provides further evidence that anticoagulant therapy is contra-indicated when recent cerebral softening is suspected.⁶

From Table II it is seen that bleeding may occur at any site. Local bleeding at the site of injection occurred frequently with intramuscular heparin but, apart from this, no site of predilection was noted for heparin as compared with the oral anticoagulants. Ulcerating lesions of the bowel and urinary bladder, stones in the urinary tract and areas of cerebral softening were conducive to bleeding, and the recognition of such lesions is a contraindication to anticoagulant therapy.

When the different anticoagulants were compared, it was seen that intramuscular heparin was attended by a significantly higher incidence of bleeding than either phenylindanedione or dicoumarol. The significance of the comparison was valid even though the five patients receiving heparin who had local bleeding at injection sites were excluded. In the dicoumarol group the incidence of bleeding was 3.4%, which is the same figure reported by Allen.⁷ The other comparison of significance indicates that more bleeding occurs with cyclocoumarol than with phenylindanedione.

In this small series, age and sex did not influence the risk of hæmorrhage. The time of onset of bleeding did not show a consistent trend. In fact, bleeding occurred at any time and vigilance on the part of the physician could not be relaxed. It was unusual for bleeding to take place in patients receiving heparin during the first forty-eight hours, which suggested that heparin might be used to initiate anticoagulant therapy with comparative safety.

Clotting times, with one exception, were within the therapeutic range when bleeding occurred. It is possible that, with intravenous heparin, the control is more precise and the danger of bleeding less. Bauer *et al.*⁸ consider intravenous heparin to be superior, from the therapeutic standpoint, to intramuscular injection. Barker,⁹ on the other hand, in the treatment of peripheral vascular disease, found that patients receiving heparin showed a greater tendency to bleed while in the therapeutic range than those receiving dicoumarol, and he suggested that heparin be employed in conjunction

with dicoumarol to initiate therapy. Our results were in accord with this observation.

In our experience prothrombin levels afforded safer control, and most bleeding occurred when the prothrombin level was in the vicinity of 10% or less. There were three patients with carcinoma and two with calculi in the urinary tract that bled when the prothrombin level was in the therapeutic range. Bleeding under these circumstances requires careful search for an underlying lesion.

Vitamin K₁^{10, 11, 12} was found to be extremely effective in correcting the hypoprothrombinæmia caused by all the oral anticoagulants. Initially a large dose (1 gram) of vitamin K₁ or K₁ oxide was given either by mouth or in an intravenous infusion. Both routes were equally effective. Lately, emulsified vitamin K₁ has become available in 50 and 100 milligram ampoules for intravenous use. These smaller doses have caused rapid restoration of prothrombin to safe levels, indicating that the earlier dosage was unnecessarily large.

One per cent solution of protamine sulphate injected intravenously immediately neutralized the action of intramuscular heparin. It was customary to give 100 milligrams; clotting times would then be checked at intervals to guard against a later rise.

SUMMARY

1. Four hundred and eighty-nine patients with thrombo-embolic disorders were assigned one of four anticoagulants by random distribution. The anticoagulants included intramuscular heparin (10,000 units per cubic centimetre), dicoumarol, phenylindanedione and cyclocoumarol. The incidence of hæmorrhage was 5.7%.

2. When the anticoagulants were compared, a significantly higher incidence of bleeding was found to occur in the group receiving intramuscular heparin than in either the phenylindanedione or dicoumarol groups. The cyclocoumarol group compared unfavourably with the phenylindanedione group.

3. Vitamin K₁ and K₁ oxide were effective in correcting hypoprothrombinæmia caused by oral anticoagulants.

4. Prothrombin determinations allowed oral anticoagulant therapy to be controlled with slight risk of bleeding. Clotting time determinations were less successful in the control of heparin therapy.

The authors wish to thank Professor R. F. Farquharson for his advice and encouragement in this investigation.

This study was supported by a grant from the National Research Council, Canada. Intramuscular heparin was provided through the generosity of the Connaught Laboratories, Toronto. We are grateful to Merck & Co., Rahway, N.J., for supplies of vitamin K₁ and K₁ oxide, and to Abbott Laboratories, Chicago, for cyclocumarol (Cumopyran, Abbott). The phenylindanedione used was Danilone (Frosst).

REFERENCES

- CAMPBELL, H. A., ROBERTS, W. L., SMITH, W. K. AND LINK, K. P.: *J. Biol. Chem.*, 136: 47, 1940.
- MEUNIER, P., MENTZER, C. AND MOLKO, D.: *Compt. rend. Acad. d. sc.*, 224: 1666, 1947.
- GUEGUEN, J. AND SOULIER, J. P.: *Rev. haemat.*, 3: 185, 1948.
- BATTLE, W. D., CAPPS, R. I., ORTH, O. S. AND MEYER, O. O.: *J. Lab. & Clin. Med.*, 35: 8, 1950.
- BROWN, K. W. G. AND MACMILLAN, R. L.: *Am. J. M. Sc.*, (In press).
- DUFF, I. F.: *Angiology*, 1: 170, 1950.
- ALLEN, E. V., HINES, E. A., KUALE, W. F. AND BARKER, N. W.: *Ann. Int. Med.*, 27: 371, 1947.
- BAUER, G., BOSTRAM, H., JORPES, E. AND KALLENER, S.: *Acta med. Scandinav.*, 136: 188, 1950.
- BARKER, N.: *Circulation*, 4: 613, 1951.
- DAVIDSON, C. S. AND MACDONALD, H.: *New England J. Med.*, 229: 353, 1943.
- JAMES, D. F., BUTLER, J. J., BENNETT, I. L. AND SCHEINBERG, P.: *J. Clin. Investigation*, 27: 541, 1948.
- MILLER, R., HARVEY, W. P. AND FINCH, C. A.: *New England J. Med.*, 242: 211, 1950.

ISONIAZID IN CHILDHOOD TUBERCULOSIS*

GLADYS BOYD, M.D.,
T. E. ROY, M.D. and
A. JOSIUKAS, M.D., Toronto

IT IS NOW nearly eight months since isonicotinic acid derivatives became available for controlled use in the treatment of tuberculosis. The untimely newspaper publicity that heralded their advent after considerable laboratory, but little clinical trial, has not been without good effect. It has stimulated widespread concentrated investigation of the merits of these drugs. This was felt necessary as, for the first time there was a cheap antituberculous drug which produced dramatic immediate response to its administration. There is still much to be learned which only the lapse of time will permit. Much valuable clinical work has been done and reported. Our own studies have advanced far enough to warrant a preliminary report on progress to date.

First, a brief summary of the investigations so far reported is in order. Isonicotinic acid derivatives were discovered as antituberculous by three observers, (Domagk,¹ Bernstein,² Grünberg³) independently at the same time. These products were obtained from the aldehyde synthesis of thiosemicarbazone. Domagk⁴ had discovered the antituberculous effect of the latter in 1946, but its toxic properties prohibited its becoming very popular on this continent. Its derivatives were to prove less toxic and more potent. Very extensive and promising results were obtained in animals and in the test tube with these compounds,

in late 1951 and 1952. A number of facts were established. First, the drugs exerted a highly specific effect on the human type of tubercle bacillus. This was less pronounced on the bovine organism and did not affect other infectious agents except mildly in the case of certain fungi. The action on the tubercle bacillus is a direct one on its metabolism. Its power is greater the more virulent the organism attacked. Most American workers say it is both antibactericidal and bacteriostatic. The English investigators say the former has not been proved. It produces increased survival time in infected mice in smaller doses than any other drug tried. In guinea pigs a more dramatic effect is produced than with any other drug except streptomycin. It is highly effective against intracerebral lesions in animals. Resistance to streptomycin and P.A.S. has no effect on its activity.

Apparently when used with streptomycin, the effect of both drugs is enhanced. This is considered a synergistic action by most, but may be only additive. It has been shown in animals that their use together reciprocally prevents the loss of sensitivity development in the tubercle bacilli.

LOSS OF SENSITIVITY

The toxic effects in animals are usually on the central nervous system. Single lethal doses may so overstimulate this system that death ensues. Convulsions and increased spasticity may follow smaller doses. Prolonged usage in rats causes no drop in haemoglobin or red blood cells, nor any gross changes in any of the tissues. There is a lag between the peak plasma concentration and the onset of convulsions. This could be due to a blood brain barrier, or to a toxic intermediary product, or both. There is good correlation be-

*From the wards and laboratories of the Hospital for Sick Children and the I.O.D.E. Tuberculosis Hospital, Toronto. The work was done with the aid of a Federal Grant for the Investigation of Antibiotics in Tuberculosis. The drug was supplied by Merrell Drug Co. (Tyvid) and Pfizer (Continazid). Read at the Annual meeting of the Hospital for Sick Children Alumni Association, November 7, 1952.

tween plasma levels and toxic effects. Prolonged toxic doses have produced liver damage in dogs.

Extensive pharmacodynamic studies⁵ have been made because of certain side effects suggesting stimulation of the autonomic nervous system. Such symptoms are constipation, most effectively relieved by prostigmine, and difficulty in initiating urine flow. Broncholytic effects of the drugs equal to that of atropine on cholinergically induced bronchospasm have been noted. Neither pupillary dilatation nor salivary gland stimulation have been produced. It required 500 times the dose of atropine to produce relief of acetylcholine induced spasms of isolated gut by isonicotinic acid compounds.

The most important fact from animal studies, aside from its antibacterial potentialities, would appear to be the work done by Suta⁶ and by Mackaness.⁷ The work showed that isonicotinic acid actually invaded the phagocytic cells and affected the intracellular organisms as well as the extra-cellular ones. Almost as soon as the possibility of chemical agents was sought to treat tuberculosis, it was considered that to be successful they would have to affect intracellular organisms. These are the first drugs found in the past decade that are capable of so doing, and it should be a most valuable property. This may be particularly true in recent infections where most of the organisms are intracellular.

Another advantage these drugs possess is that the pH has little effect on the activity of these compounds, whereas streptomycin is inhibited by acid media. Caseous material is usually acid, so that large masses of this substance were not only penetrated to only a slight extent by streptomycin, but its effects was further decreased by its acid nature.

There have been many more *in vitro* and animal studies than chemical ones on the isonicotinic acid compounds to date. A large number of the latter are now being published. As with other antituberculous drugs, the development of resistance of the organism will probably present a problem. According to the literature, but not to our results, there is a higher percentage of initially resistant mutants to isonicotinic compounds than to streptomycin. Our laboratory studies will be published in detail shortly by one of us. To date, with four months of following the resistance, the level of sensitivity has remained very constant, generally between 0.16 and 0.32 mgm. per c.c. The sensitivity has been

unaffected by the streptomycin sensitivity, whether or not this drug had been previously used. This was true even with such low value of streptomycin that organisms flourished in concentrations of 500 mgm. per c.c.

It has been demonstrated that high plasma levels are readily attained and held; and that in the presence of tuberculous meningitis spinal fluid levels are sufficiently high to be effective. This is most important as it may permit the treatment of many cases of meningitis without intrathecal drugs, by using oral isoniazid and intramuscular streptomycin, as reported by Clark⁸ *et al.*

The toxic effects in humans may be on the central nervous system as in animals, resulting in increased spasticity and convulsions. This in our experience has made it less desirable than streptomycin and P.A.S. in the severe, almost decerebrate cases of meningitis, as in this disease, the severe electrolyte unbalance and altered intracellular fluid tend to produce these in any case, and another factor is just another worry. In conscious patients these effects may be minimized by reducing the dose or giving phenobarbital at such time that its effectiveness will coincide with the maximum plasma level.

Rashes occur occasionally. In the three cases in our series in which these were troublesome, discontinuance of concurrent administration of a B compound containing nicotinic acid was curative. Two severe meningeal cases developed purpura one having large hæmorrhagic effusions. They disappeared with discontinuance of the isoniazid. Urinary difficulties have not been observed in any of the children treated with the drug. Severe constipation has been particularly troublesome in babies. Prostigmine has alleviated but not cured the trouble.

Chronic toxicity may cause liver damage but to date routine cephalin flocculation tests and occasional van den Bergh's have been so uniformly normal that we have considered discontinuing them as routine procedure. Urobilin has not infrequently been found in the urine, but this is by no means a rare finding in tuberculous children. Anorexia developing after a course of isoniazide is not infrequent. It is sometimes associated with vomiting. We have regarded it as a toxic effect and reduction of the dose has resulted in its disappearance.

Complete hæmatological studies including red and white blood counts, hæmoglobin and smears

have been done on all the children. No ill effects have been observed. The hæmoglobin has fallen somewhat but to no greater degree than the severity of the disease would cause.

Rapid absorption of isoniazid from the gut occurs, giving effective blood levels in one-half to one hour. Parenteral administration would therefore appear unnecessary. In our series, it was used intramuscularly twice and in both had to be discontinued because of convulsions. These appeared to arise from a cumulative effect. It has been shown to be readily diffusible in the spinal fluid when disease is present there. Ten times the effective dose can readily be obtained, and levels 14 to 65 times this have been reported.⁹ Effective levels have been attained in our cases, but spinal fluid ones have fallen to a negligible amount after twelve hours even in cases showing good therapeutic response. The maximum plasma level was usually one and a half hours after administration of a dose.

The immediate dramatic weight gains in the children were not usually attended by a concomitant increase in appetite. This suggested either a chemical change or androgenic effect. The determination of sodium and chloride and blood protein in a few cases did not indicate œdema to be responsible. It was therefore decided to investigate the adreno-cortical function. Our interest in this was stimulated by the development of a Cushing's syndrome in three children under nine, and the cortisone like effect on others. In the Cushing cases, one boy and two girls, there was marked breast development, fat hips and abdomen and slender arms and legs. Tuberculin tests were repeated in all treated cases because of the report by Steenken¹⁰ of the cortisone-like effect of the drugs on this test in animals. Only two of the children showed a possible effect of this kind, their tuberculin tests resulting in the production of a white area of induration but no redness. Studies of 17 ketosteroid excretion were then started and were at first disappointingly normal. Repeated determinations over the months have shown significant rises (Fig. 1). The only one showing no increase after three months' therapy was high at first, and was in a pubescent girl. These studies plus that of the 11 corticosteroids and the follicle stimulating hormone are being continued.

CLINICAL CASES

Fifty cases of childhood tuberculosis have been treated so far. The only ones in which the drug was discontinued were three meningeal cases to be discussed later. Initial sensitivities were usually good and have been maintained. The dosage from March 1952 to the end of May was 3 mgm. per kilo. This was increased to 10 mgm. per kilo after the May meeting of the American Trudeau Society. This has been maintained from two to four months without toxic symptoms in most. It has usually been reduced to 5 mgm. per kilo at the end of this time or sooner if anorexia developed. In most cases its use has not been terminated to date unless cortisone like effects were pronounced.

17 Ketosteroids Excretion in Patients on Isoniazid

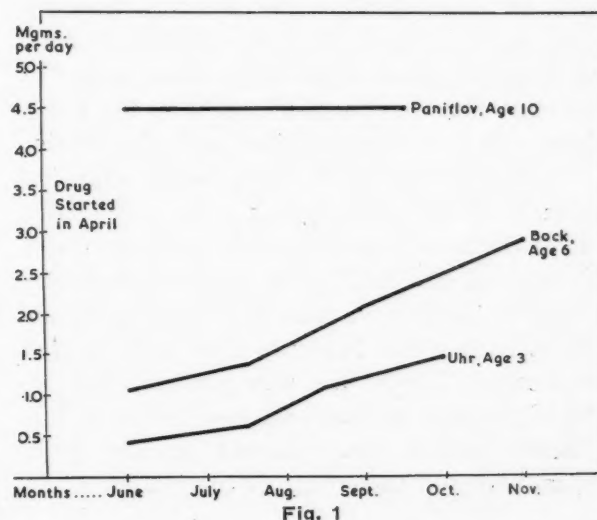


Fig. 1

Weight gains were usually rapid at first. Most of them reached a plateau as they approached the normal for their age, but some have continued to gain in considerable excess of normal. Sedimentation rates of 40 or less usually fell promptly. Higher ones were little affected, and certainly showed no defervescence in excess of that caused by decrease in activity of the disease. Temperatures usually became normal early. In those not returning to normal levels the sawtooth effect was ironed out.

Sputum conversions judged by cultures and guinea pig inoculation have been as good as with streptomycin in most cases. Spinal fluids have likewise, but somewhat less rapidly responded.

The following types of case have been treated: (1) Meningitis 10. (2) Tracheo-bronchial ulceration 10. (3) Miliary 4. (4) Extensive pulmonary

disease 3. (5) Massive mediastinal glands 2. (6) Pleural effusions. (7) Pericarditis 2. (8) Surgical.

Meningitis.—No meningeal case has been treated with isoniazid without streptomycin. Our mortality in this disease with streptomycin and P.A.S., and in blocked cases with these plus burr holes and tuberculin has been reduced to 15 to 20% in the past few years, and we were unwilling to risk withdrawal of streptomycin. The cases in which isoniazid has been used in addition may be divided into two groups: (a) far advanced almost terminal cases, (b) early cases, not completely unconscious.

In the first group we consider the use of isoniazid dangerous until the patient has improved somewhat. This is because of several factors. These cases produce a profound electrolyte imbalance and alteration of intracellular fluids. We know little of the effect of the isonicotinic acid on these, but from clinical observation know they are apparently made worse by their use. This applies particularly to the hypokalaemia. It is our opinion that further reduction of mortality will result from better chemical treatment of the disturbed chemistry. Secondly, in most of these cases tuberculin is being given. This, the disease itself and the altered chemistry all tend to produce convulsions. Isonicotinic anhydride having this tendency also adds another complication. Lastly, the only patients that developed purpura on isoniazid were in this group.

These patients may benefit greatly from isoniazid later in the course of their disease.

To summarize one case, E.G., a three year old child who was admitted April 1952 with far advanced meningitis. Streptomycin and P.A.S. were given six months and stopped then because he was in a decerebrate state and apparently going to die. He had also had prefrontal burr holes done early in his treatment to relieve the high intracranial pressure and permit introduction of therapy into the ventricles because of spinal fluid block. He was given several courses of tuberculin (P.P.D.) intraventricularly. He appeared to improve a little when the therapy was discontinued. He was put on 10 mgm. of isoniazid daily by mouth. This had been tried initially but discontinued because of the production of purpura. This did not recur. In the past three months he has been showing continued improvement both clinically and bacteriologically and now presents a reasonable hope of a good recovery.

In the early cases, seven in number, the results to date are promising. Four of these have had streptomycin intrathecally and intramuscularly as well, the isoniazid replacing the usual P.A.S. Three others are getting no intrathecal treatment, but are receiving isoniazid and intramuscular streptomycin. Lumbar punctures are done every

second or third day to relieve any increased intracranial pressure. The clinical progress of this entire group toward recovery has appeared more rapid than with other drugs. In the last three, progress is good both clinically and as to conversion and reduction of cellular elements. Good spinal fluid concentrations of isonicotinic acid are obtained in one and a half to three hours after administration, but are negligible in twelve hours. One of the patients getting intrathecal streptomycin and isoniazid was referred from a distant city for burr holes because of spinal block. This has not been done and the block has gone. This has not been accomplished with any previous drug combination.

Tracheo bronchial ulcerations have so far shown the most striking improvements of any type of tuberculosis in our series. We have been

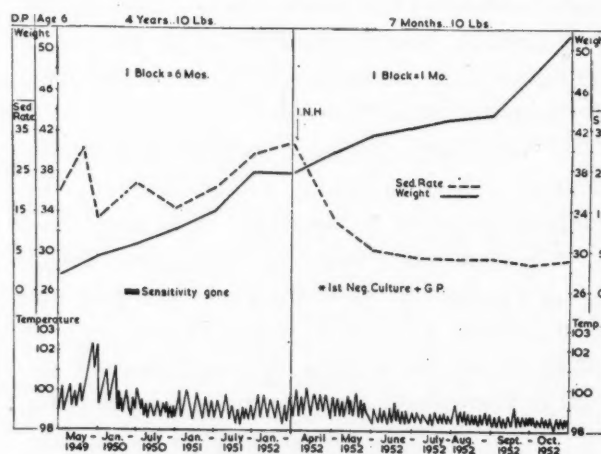


Fig. 2.—Isoniazid in tuberculosis.

studying this type of disease rather thoroughly in the past five years by means of bronchoscopic studies and pathological study of resected specimens. Early in the streptomycin days, it was hoped that bronchoscopic suction of infected bronchi plus streptomycin might not only heal the ulcer but prevent constrictive lesions and secondary bronchiectasis. Our hopes were not fulfilled and resections have all too frequently been needed. We have been impressed that with isonicotinic acid derivatives the "wheeze" characteristically present and often bothersome, disappears more rapidly. This may possibly be due to the effect of the drug on bronchospasm. Citation of two cases will illustrate the effect.

1. J.W., age 3, had a large deep ulcer involving the right main bronchus and extending into the trachea. The associated glands were large, compressing the airway to a narrow chink. Relief by bronchoscopic suction of obstruction and subsequent collapse of lung became impossible because of the pressure of the glands. Her life was in jeopardy and no helpful surgical measure avail-

able. After two months on isoniazid, her respiratory difficulty disappeared and at the end of three months when bronchoscopies were again possible, the ulcer was found completely healed.

2. P.S., 8 years old. This boy had a large granulating tuberculous ulcer in his right main bronchus. The granulations frequently plugged the bronchus and necessitated bronchoscopic suction and removal of granulations. He had intramuscular streptomycin six months. This resulted in some decrease in the growth of granulations but still needed interference every five to six weeks. He went on isoniazid in March. In June considerable improvement was noted. By September the ulcer was healed and two small granulations containing healed tubercles were removed. He has no sign of recurrence yet.

Miliary tuberculosis treated with isoniazid alone in two cases has shown good clinical and conversion response, but less radiological improvement in three months than is seen with streptomycin. The third patient developed more lesions and larger glands with persistent positive sputum despite the fact that sensitivity of her organism to the drug was good (0.16 to 0.32 mgm. per c.c.). Her sedimentation rate remained at about 60. Her temperature fell from an initial swing of 103 to 104 but did not return to normal nor lose its sawtooth character. Streptomycin was therefore added to the therapy. The fourth case did not show the expected improvement, so after three months streptomycin was added.

Extensive parenchymal lesions, both cavities and caseous pneumonia have improved. They have not been treated in sufficient numbers as yet to draw any conclusions.

Tuberculous pericarditis has been treated in two cases, one of which has been cured and is going home. The other is clinically well but still shows electrocardiographic changes of activities and is still under treatment. The first case is the one whose progress is shown in the figure, and whose disease appeared at a standstill for nearly a year and was cured as judged by the E.C.G. and clinical progress after three months on isoniazid.

Massive mediastinal tuberculosis was treated twice with isoniazid. It was hoped that this drug might penetrate such lesions better, and not be inhibited by its acid nature, as were its fore-runners. In one case such expectations were justified by almost dramatic changes in this slowly healing type of lesion. In the second, no change occurred in the glands and parenchymal involvement so streptomycin was added. The sensitivities of the organism were the same in both cases.

Two cases of *pleural effusion* have been treated. One was primary and abacterial, the

other bacillary. There was no demonstrable effect in either.

As yet an insufficient number of *surgical cases* have been treated to form any conclusions. One with a persistent bacillary positive sinus from a hip of one and a half years' duration which had failed to respond to six months of streptomycin completely healed in three months. Two tuberculous mastoids, which had had simple mastoid-ectomies plus all kinds of antibiotic therapy and failed to improve, were healed in three to four months.

SUMMARY

1. Isoniazid is a drug with profound effect on the human tubercle bacillus. Most of these organisms are sensitive to the drug, and do not lose this sensitivity for some months.
2. Oral administration produces good plasma levels, and in the presence of meningitis, good spinal fluid levels. There seems therefore no indication for parenteral treatment.
3. It produces rapid initial beneficial effects in most cases, even if this is not maintained and other drugs have to be added later.
4. Cortisone-like effects, or adrenogenic ones are noted fairly often. In a few cases they are marked. The drug may cause increased ketosteroid excretion over a period of months.
5. It should not be used without streptomycin in meningeal cases. In early cases of the disease it may eliminate the necessity for intrathecal therapy. Streptomycin is given by the intramuscular route alone.
6. It should not be used in far advanced cases of meningitis because of its additional disturbing effect on the electrolyte balance and its tendency to produce convulsions.
7. To date, its most striking regular effect has been on tracheo-bronchial ulceration.

REFERENCES

1. DOMAGK, G., OFFE, H. A. AND SIEFKEN, W.: *Deutsche med. Wochenschr.*, 77: 573, 1952.
2. BERNSTEIN, J., LOTT, W. A., STEINBERG, B. A. AND YALE, H.: *Am. Rev. Tuberc.*, 65: 357, 1952.
3. GRÜNBERG, E. AND LEUVANT, B.: *Proc. Soc. Exp. Biol. & Med.*, 77: 47, 1951.
4. DOMAGK, G., BEHNISCH, H., MIETSCH, T. AND SCHMIDT, H.: *Naturwissenschaften*, 10: 315, 1946.
5. BENSON, P. L., STEFANO, P. L. AND ROE, M. D.: *Am. Rev. Tuberc.*, 65: 376, 1952.
6. SUTA, E.: *Am. Rev. Tuberc.*, 65: 775, 1952.
7. MACKANESS, G. B. AND SMITH, N.: *Am. Rev. Tuberc.*, 66: 125, 1952.
8. CLARK, C. M., ELMENDORF, D. F., CAWTHORN, W. V., MUSCHENHEIM, C. AND McDERMOTT, W.: *Am. Rev. Tuberc.*, 66: 391, 1952.
9. ELMENDORF, D. F., CAWTHORN, W. D., MUSCHENHEIM, C. AND McDERMOTT, W.: *Am. Rev. Tuberc.*, 65: 429, 1952.
10. STEENKEN, W. AND WOLINSKY, E.: *Am. Rev. Tuberc.*, 65: 365, 1951.

A REPORT ON THE SURVIVAL OF THE PATIENTS TREATED FOR CANCER FROM 1935 TO 1947 INCLUSIVE

NORMAN A. McCORMICK, F.R.C.S.,
F.A.C.R., Windsor, Ont.

SINCE THE OPENING of the Cancer Clinic and establishment of the Neoplastic Service in the Metropolitan General Hospital 4,523 patients have been treated for cancer. Inasmuch as there has been no report on the long term survival from all varieties of cancer in Ontario and because accurate follow-up records have been maintained on 99.7% of our patients, there is sufficient experience to warrant publication.

The histories of 1,204 persons alive five years after treatment of microscopically proved cancer

under review, a gratifying and for the most part consistently steady increase has taken place in the survival rate, until we now confidently expect more than 50% of our patients with cancer to be alive five years later (Table I). The improved position of the cancer patient at this time is accentuated by a personal communication from the late Dr. James Ewing, who in 1935 said that a well organized cancer clinic might expect to salvage 25% of its patients.

Excluding patients with the more easily curable cancers of the skin, the absolute five-year survival rate for all patients with cancer seen in the clinic in 1935 was 17% and in 1936, the first full year of operation, 29%. The survival rate for 1947 was 45%. No major change took place in the equipment used between 1935 and 1948. The better results attained in later years are, in our opinion, due mainly to an increased famili-

TABLE I.

SURVIVAL RATES OF PATIENTS WITH CANCER							
	<i>Patients admitted</i>	<i>Alive at the end of 5 years</i>	<i>%</i>	<i>Alive at the end of 10 years</i>	<i>%</i>	<i>Alive at the end of 15 years</i>	<i>%</i>
1935.....	48	12	25	8	17	8	17
1936.....	158	59	37	43	27	35	22
1937.....	151	66	44	44	28	26	17
1938.....	152	52	34	32	25		
1939.....	193	71	37	48	25		
1940.....	217	92	42	62	29		
1941.....	215	92	43	59	27		
1942.....	237	100	42	82	35		
1943.....	260	101	39				
1944.....	288	133	46				
1945.....	237	105	44				
1946.....	308	155	50				
1947.....	299	166	56				
	2763	1204	44	378	28	69	19

While the capacity to successfully treat cancer can be better shown by *net* figures, which exclude from analysis untreated patients or those dead of intercurrent disease, or other causes, for comparative purposes exclusions are open to criticism and the figures used throughout this paper are *absolute* unless otherwise specified. Untraced patients and those dying of natural or other causes, or intercurrent disease are included amongst the deaths. There are no exclusions.

offer ample proof that this disease can be cured. Two hundred and ninety-eight of these patients have since died—91 of cancer, 207 of old age or other causes, but 906 remain well and free from any sign of their cancer for periods of five to seventeen years.

Forty-four per cent of the 2,763 cancer patients admitted to the Clinic between December 5, 1935 and January 1, 1948 lived five years. More significantly, in the thirteen-year period

TABLE II.

SURVIVAL FROM CANCER (SKIN EXCLUDED)							
	<i>Patients admitted</i>	<i>Alive at the end of 5 years</i>	<i>%</i>	<i>Alive at the end of 10 years</i>	<i>%</i>	<i>Alive at the end of 15 years</i>	<i>%</i>
1935	42	7	17	5	12	5	12
1936	127	37	29	27	21	23	18
1937	112	34	30	23	21	16	14
1938	126	36	29	20	16		
1939	153	41	27	28	18		
1940	171	58	34	46	27		
1941	167	51	30	33	20		
1942	189	64	34	56	30		
1943	201	54	27				
1944	213	78	37				
1945	177	62	35				
1946	236	97	41				
1947	216	97	45				
	2130	716	34	238	22	44	16

Less satisfactory results obtained in 1941 and 1943 reflect upon the longer delay in seeking attention, prevalent during the overworked war years.¹ Although this inertia has been partially remedied, there is still an abundant opportunity for the earlier treatment of cancer. There has been no significant alteration in the ratio of patients admitted in the early and late stages of disease.^{2, 3} The 25 women with cancer of the breast or cervix uteri, most recently admitted to our clinic, delayed seeking treatment for an average elapsed period of six months after they themselves recognized awe-inspiring symptoms. This is explainable only on the basis of an unjustifiable fear. There is no legitimate economic factor to be considered.

arity with the disease, influenced to a lesser degree by the use of antibiotic and hormonal therapy.

The results, in terms of survivals from cancer in all its manifestations are given in Tables III and III A.

CANCER OF THE SKIN

The largest single group of patients had cancer of the skin—633, usually in such exposed areas as the face, neck and hands. Satisfactory healing has resulted in a general tendency to consider these tumours relatively unimportant. Although the basal cell carcinomata are prone to remain localized, spreading only by direct extension, squamous cell tumours occasionally metastasize early. Treatment results are good, largely because these patients are usually seen when their growths are much smaller than are cancers of other areas. The treatment of choice in our clinic is by irradiation, either with x-ray or radium,

supplemented by surgical excision if there is involvement by the tumour or infection, of bone, cartilage, or the contents of the orbit. Seventy-seven per cent of the patients with cancer of the skin were alive and free from any sign of growth after five years. One per cent died of cancer. The fatalities were almost exclusively confined to patients who first presented themselves in advanced stages of disease. The remainder died of intercurrent illness or old age.

CANCER OF THE BREAST

Cancer of the breast occurred next most commonly. These 433 patients were not treated in

TABLE III.

SURVIVAL BY SITE OF DISEASE									
Site	Patients admitted	Status at end of 5 years							
		Died of old age or intercurrent disease	Died of or with cancer	Untraced	Alive	Gross 5 year survival rate			
						1935-39	1940-44	1945-47	1935-47
Total	2763	226	1326	7	1204	37%	43%	50%	44%
Skin	633	135	7	4	487	74	77	79	77
Total excluding skin	2130	91	1319	3	716	28	32	41	34
CARCINOMA									
Breast	433	15	231		187	32	38	59	43
Uterus	350								
Cervix		274	9	144	121	30	44	60	44
Fundus		76	6	31	39	(50)	49	56	51
Large bowel	229								
Caecum		15	12		3				20
Colon		51	45		6				12
Rectum		156	7	102	47	15	35	34	30
Anus		7	1	5	1				
Lip	171		33	20	116	63	69	72	68
Stomach	118			118	0				0
Bladder	98		4	71	23	23	16	40	23
Lung	68			64	4*				6*
Ovary	55		1	39	15	(21)	35	(24)	27
Larynx	38								24
Intrinsic		22		14	8				36
Extrinsic		16		15	1				6
Intra-oral	36				17				47
Buccal mucosa		23	1	9	13				57
Floor of mouth		4		3	1				
Infer. alveolus		2		1	1				
Super. alveolus and hard palate		4	1	3	0				
Soft palate		3		1	2†				
Esophagus	33			30	1				4
Prostate	27			26	1				4
Carcinomatosis	27			26	1				32
Tonsil	25		1	16	8				25
Tongue	24		4	14	6				40
Thyroid	20		1	11	8				10
Kidney	20				2				
Carcinoma		10		9	1				
Hypernephroma		4		4					
Wilm's		6		5	1				
Vulva	15			9	6				40
Brain	12			8	4				(33)
Testes	12		1	6	5				(42)
Pharynx	11				0				(0)
Nasopharynx		2		2	0				
Pharynx		6		6	0				
Hypopharynx		3		3	0				
Antrum	9			5	4				(44)
SARCOMA									
Melano-sarcoma	30			19	11				37
Lympho-sarcoma	27		1	24	2				4
Fibro-sarcoma	13		1	6	6				(46)
Hodgkin's	48			36	12		32		25
Lymphoblastoma	14			8	6				(43)
Myelogenous leukaemia	27		1	24	2				4
Lymphatic leukemia	22		1	21	0				0

*Diagnosis unconfirmed in one. Two died of carcinoma of the lung in the 6th and 8th years, respectively. One with confirmed cancer is alive after 13 years.
†Diagnosis unconfirmed in the two living cases.
Rates based on fewer than 15 cases are bracketed.

a uniform manner. Some were referred to the clinic for x-ray therapy at irregular intervals after simple or radical mastectomies or other operations of variable extent. A few came after a local or even partial tumour excision. Some were suffering from locally or widely spread, recurrent cancer. Others were primary tumours in patients who had not yet been operated upon and many of these were quite unsuitable for operation. Forty-three per cent of the series lived five years, 3% died of intercurrent disease and 54% of cancer; 59% of the 1945-47 patients survived.

Deaths from cancer of the breast are most often the result of generalized carcinomatosis. Three opportunities exist for the cancer to spread. The axillary lymph nodes are usually involved before the patient consults her physician and widespread dissemination may already have taken place. Under these circumstances no treatment modality avoids the inevitable outcome. Metastases may occur at a later date, from failure to eradicate cancer from the breast or surrounding chest wall and axilla. Undoubtedly the trauma of operative interference spreads a number of these growths.

It is possible that the greatest use for x-ray therapy in the treatment of patients with operable cancer of the breast may be found in an attempt to lessen the frequency of the dissemination of tumour cells, that may take place with even the most careful operative technique. There can be no question that Roentgen therapy exerts a profound influence on these tumours. The cancer cells undergo visible changes, many disappear, the others often become walled off by fibrous tissue. A dormant period commonly follows. Cancericidal doses are not given, and there is no deliberate attempt to obliterate the tumour by preoperative x-ray therapy. It does, however, seem possible that one might operate upon these tumours with considerably less likelihood of traumatic spread if done while in the partially devitalized condition brought about by preliminary irradiation. From the inception of our clinic it has been the policy to operate upon cancer of the breast only after x-ray therapy has been given.

Bearing in mind that the disease has all too frequently spread before we see the patient, one cannot expect a dramatic improvement on the results of conventional treatment by use of preoperative irradiation. Nevertheless, results ob-

TABLE III A.

SURVIVAL BY SITE OF DISEASE—Continued				
Site	Patients admitted	Status at end of 5 years		
		Died of old age or intercurrent disease	Died of or with cancer	Alive
Penis.....	8		2	6
Vagina.....	7	1	3	3
Urethra.....	6		4	2
Salivary glands..	5		3	2
Pancreas.....	4		4	0
Gall-bladder....	3		2	1
Bile ducts.....	3		3	0
Ampulla of Vater	1		1	0
Hepatoma.....	3		3	0
Retino-glioma...	3		3	0
Adamantinoma...	2			2
Internal nares...	2		1	1
Small bowel....	2		2	0
Branchial cyst...	2		1	1
Clitoris.....	2		2	0
Scrotum.....	2		1	1
Fallopian tube...	1		1	0
Seminal vesicle..	1		1	0
Chorio-epithelioma...	1		1	0
Juvenile nasopharyngeal fibroma.....	1			1
Appendix.....	1		1	0
Giant cell tumour.....	3		1	2
Schuller-Christian's disease.	1		1	0
Mediastinal tumour.....	1		1	0
Cholesteatoma...	1			1
Retroperitoneal sarcoma.....	8		7	1
Osteo-sarcoma...	6		6	0
Reticulum cell sarcoma.....	4		3	1
Myeloma.....	4		2	2
Uterus (sarcoma)	4	1	1	2
Ovary (sarcoma)	1	1		0
Parotid (sarcoma)....	2			2
Liposarcoma....	2		1	1
Myosarcoma....	2		1	1
Neurogenic sarcoma.....	2			2
Neurofibroma sarcoma.....	2			2
Spindle cell sarcoma.....	2			2
Ewing's tumour.	2		1	1*
Myxosarcoma...	1		1	0
Myxofibrosarcoma.....	1		1	0
Fibrosarcoma of mandible.....	1		1	0
Myxochondroblastoma.....	1		1	0
Haemangiosarcoma.....	1			1
Meningeal fibroblastoma of cord (spinal)...	1			1
Sacral chordoma	1		1	0
Synovioma.....	1		1	0
Monocytic leukaemia.....	1		1	0
Aleukæmic leukaemia.....	1		1	0

*Diagnosis unconfirmed.

tained wherever we have had the opportunity of irradiating before operation appear to substantiate this premise. One hundred and forty-four patients with previously undisturbed primary cancer of the breast were operated upon after a preliminary course of 200 kv. irradiation, 84 or 58% lived five years. Seventy similar patients were referred for x-ray therapy after operation and 32 of these or 46% lived five years.

The improvement derived from the use of pre-operative x-ray therapy is most manifest in the stage 2 and 3 cases. Clinically classified stage 1 cancers all too commonly are found at operation to have axillary node involvement and must be reclassified as stage 2. Inasmuch as most of the

and patients not considered suitable for operation are best treated radiologically.

CANCER OF THE CERVIX

The 274 patients with cancer of the cervix followed in order of frequency. Those with recurrent cancer, after unsuccessful treatment elsewhere, are included, as well as individuals with primary disease. Carcinoma *in situ* is not considered to be cancer and is not represented in the analysis. The cancers of the cervix were treated by external 200 kv. Roentgen irradiation, followed by the intra-cavitary applications of radium.⁴ Injuries resulting from the irradiation are insignificant.⁵ The overall survival rate was 44%, 3% died of intercurrent disease. The survival rate rose from 30% for those admitted during the first five-year period to 60% for 1945-47.

CANCER OF THE LIP

The primary lesion is treated either by x-ray or radium or a combination of both agents. Clinically uninvolved neck nodes are left undisturbed. Nodes found to be enlarged on admission or those developing at a later date are relatively uncommon and are dealt with in the manner and in accordance with the criteria originally postulated by Quick.⁶ 171 patients were treated, 68% survived, 19% died of intercurrent disease, 12% of cancer and 1% remain untraced.

CANCER OF THE RECTUM

Although operation is favoured, these growths should not be considered exclusively surgical problems. Early tumours situated well above the peritoneal reflection are removed with sufficient attached mesentery to ensure adequate lymph node dissection, and the continuity of the bowel is re-established. Ampullary resection and procto-sigmoidectomy, as described by Bacon, have been utilized on a small and carefully selected group with satisfactory results. For most patients an abdomino-perineal resection was preferred. Operation is preceded in some of the more advanced cases by x-ray therapy, and is augmented occasionally by interstitial radium implants. Inoperable patients are benefited by a short course of Roentgen therapy⁷ and at times are treated by radical irradiation. Thirty per cent of the 156 patients survived five years; 4% died of intercurrent disease. In the

TABLE IV.

SURVIVAL FROM CANCER OF THE BREAST			
Treatment employed	Number of patients	Alive at the end of 5 years	Absolute 5-year survival rate
Preoperative Roentgen therapy and radical mastectomy with or without postoperative Roentgen therapy.....	144	84	58%
Referred following radical mastectomy for postoperative Roentgen therapy....	70	32	46%
Partial operation and Roentgen therapy.....	20	12	60%*
Biopsy or local excision, Roentgen therapy and radical mastectomy.....	15	7	47%*
Roentgen therapy and simple mastectomy.....	12	5	42%*

*Patients in the last three categories were for the most part carefully selected and the results obtained are not strictly comparable.

cures are to be obtained from these early cases, it is necessary to ensure they receive the best possible treatment. We believe, accordingly, that preoperative therapy should be given to clinical stage 1 cancer and not be restricted to the stage 2 and 3 patients. An additional course of Roentgen therapy is given to stage 2 and 3 patients postoperatively.

Experience with local tumour excision and simple mastectomy, both before and after x-ray therapy, has not been sufficiently extensive to warrant abandoning a more satisfactory procedure. The results on a few and for the most part carefully selected patients are given in Table IV. There are definite and well known criteria of operability for cancer of the breast

early period 15% were saved in the last group 34%. The growth was resected in 82 patients and 41 of these were alive five years later. One has lived 15 years.

Prior to the establishment of the Clinic, 9% of these patients were being operated upon in our hospital. Originally we operated upon 40%, later the operability rate rose to 84 and during this time the hospital mortality fell from 40 to 3%:¹ 55% of those who survived operation lived five years. More recently the proportion of patients deemed operable has, with benefit, been reduced to 68%.² It is perfectly feasible to excise most cancerous rectums, with perhaps the uterus or portions of the attached vagina or bladder, but when the growth has extended to other regions, such as the prostate or pelvic wall, this may on occasion do more harm than good. Some patients are being operated upon ill advisedly.

There are in the series a number of five-year survivals following upon conventional radiotherapy to a group of patients who were unquestionably incurable by surgery. We believe, along with Cade and many others, that super-voltage or Cobalt-60 beam therapy will in the future play a definite part in the control of some of the patients with this disease.⁸ Decision on management of the individual patient with cancer of the rectum carries a heavy responsibility.

CANCER OF THE STOMACH

Our treatment of this tumour prior to 1948 was consistently unsatisfactory. Exclusively surgical problems as yet, these patients are less likely to appear in a cancer clinic than those with more radio-sensitive neoplasms. Clinics are frequently looked upon as a last resort for patients with cancer of the stomach and receive an unusually large proportion of terminal cases; so it is not surprising that 108 in the series of 118 patients were judged to be unfit for gastric resection. Subtotal gastrectomy performed in the 10 most favourable instances gave a reasonable degree of relief from symptoms and some prolongation of life, but failed to provide a five-year survival. The only satisfactory conclusion is that the decision to not operate, made on so many occasions, was justifiable. Radical surgical techniques, adopted with increasing frequency in recent years, more nearly fulfill the requirements of truly cancericidal procedures and offer some prospect for betterment. We have failed badly in our recognition of this disease, and the earliest

cancers seen in the stomach would indeed be considered advanced were they located in more accessible organs. Hope for the future must lie in earlier detection, and it is probable that an increasing number of these patients will be treated either as an adjunct to surgery or exclusively by Cobalt-beam therapy.

CANCER OF THE BLADDER

Those few patients fortunate enough to have early growths situated in the vault of the bladder are subjected to a partial cystectomy. Unfortunately, the majority of these tumours originate in the region of the trigone and are unsuitable for this operation. Treatment has left much to be desired. The author cannot be satisfied with superficial fulgurization of cancer. We have preferred heavy external irradiation followed by suprapubic cystotomy and radon implantation. Twenty-one per cent of the 98 patients with cancer of the bladder lived five years. Again, newer developments appear promising.

CANCER OF THE FUNDUS

In accordance with the teaching of Healy,⁹ operable carcinoma of the fundus is treated by the application of intra-uterine radium followed in six weeks, for all except those with totally anaplastic tumours, by a complete panhysterectomy. The fundus, entire cervix, both tubes, both ovaries, and a small cuff of the vagina are removed. Seventy-four per cent of the patients so treated were alive five years later. Cancer of the fundus can be treated satisfactorily, but with less certainty by irradiation alone. This is the method of choice for inoperable patients and those with highly malignant undifferentiated tumours. The radium dosage is supplemented in the latter instance by a full pelvic cycle of x-radiation.

Fifty-one per cent of the 76 patients with cancer of the fundus survived. Eight per cent died of intercurrent disease.

CANCER OF THE LUNG

We have looked upon this disease as best treated surgically. No patient referred by us for operation or received postoperatively for Roentgen therapy has survived. Despite improved surgical techniques and the demonstrated ability to perform these operations with acceptable risk, the large number of operations being performed

with minimal success everywhere has caused us to adopt a very skeptical attitude. Although our results with irradiation have not been satisfactory, they have at least excelled those with thoracic surgery. Three microscopically proved cases of carcinoma of the lung treated solely by irradiation and alive at the end of five years offer promise for the new methods of radiotherapy.

CANCER OF THE OVARY

Cancer of the ovary, like cancer of the bladder, is a disease over the management of which we do not feel there has been proper control. Most patients were referred after having already been operated upon. The records indicate growth beyond the limits of surgical excision in 35 patients, six or 18% survived. The diagnosis, difficult to make beforehand, can always be established at operation, but failure on the part of the surgeon to recognize cancer or other cause led to inadequate removal in 11 operable patients: four or 36% lived. In nine instances a total panhysterectomy and bilateral salpingo-oophorectomy was done and five or 55% were alive five years later. All cases received 200 kv Roentgen therapy postoperatively. Fifteen of the 55 patients with cancer of the ovary survived—27%.

The experience with cancer in the remaining less common sites is shown in Tables III and III A and treatment methods have been previously outlined for intra-oral, tongue, and laryngeal cancer.¹⁰ The difficulties encountered in treating cancer of the intrinsic larynx have been largely overcome with decided improvement in recent results.¹¹

Although this report deals only with the prolongation of life over long periods of time, it is an important function of a cancer clinic to ameliorate symptoms wherever possible. Palliative relief, not infrequently accompanied by a considerable extension of the patients' span of life, is often obtained even with those who are incurable. Thirty-eight per cent of the patients in this series were admitted in a condition suitable only for palliation. More effective public education and the eradication of unreasonable fear could lower this figure appreciably. Momentous changes now taking place in the armamentaria against cancer—the most important advances in radiotherapeutic equipment in more than 20

years—offer hope that the proportion of curable patients will increase.

CONCLUSIONS

1. The outlook for the cancer patient has improved.
2. A degree of centralization is essential for adequate treatment of cancer, but it is not necessary that this be limited to only the very large areas of population.
3. On the contrary, comparison with published results^{12, 13} shows that the existence of the smaller cancer clinic is amply justified.
4. Clinics in the smaller centres, if adequately staffed and equipped, have many advantages. They make possible a degree of personal attention that is unattainable in large Institutes and the patients appreciate the proximity to their homes and support of their family physicians. The influence of these factors is reflected in the final results.
5. With newer developments we look to the future with considerable optimism.

The Clinic functions as one of the eight Ontario Cancer Centres, which have in recent years come under surveillance of The Ontario Cancer Treatment and Research Foundation. Financial aid has been received from both the latter body and the Ontario Department of Health. We are indebted also to the Essex County Unit of the Canadian Cancer Society, which has supplied drugs, dressings, transportation, and many other essentials and comforts, as well as grants in aid of statistical research and clinic furnishings. Especial thanks are due the Victorian Order of Nurses, Public Health Agencies not only in Ontario but also throughout Canada and parts of the United States, and to many other organizations and individuals for their aid in maintaining a uniquely successful follow-up system. The co-operation of the medical and technical staffs throughout and of our professional colleagues in the reference, treatment, and maintenance of contact of patients has made this work possible.

REFERENCES

1. McCORMICK, N. A.: *Canad. M. A. J.*, 55: 460, 1946.
2. *Idem*: *Canad. M. A. J.*, 64: 403, 1951.
3. *Idem*: *J. Canad. Assoc. Radiologists*, 2: 2, 1951.
4. *Idem*: *Canad. M. A. J.*, 49: 178, 1943.
5. *Idem*: *Canad. M. A. J.*, 67: 25, 1952.
6. QUICK, D.: *Am. J. Roentgenol. & Rad. Ther.*, 33: 677, 1935.
7. McCORMICK, N. A.: *Radiology*, 42: 531, 1944.
8. CADE, SIR STANFORD: Personal Communication.
9. HEALY, W. P.: *Am. J. Surg.*, 27: 401, 1935.
10. BRODEUR, P., McCORMICK, N. A., RICHARDS, G. E., SELLERS, A. H., SMITH, I. H. AND WALKEY, A. E.: *Canad. M. A. J.*, 50: 556, 1944.
11. McCORMICK, N. A. AND MAUS, J. H.: *J. Canad. Assoc. Radiologists*. (In Press.)
12. PATERSON, R., TOD, M. AND RUSSELL, M.: The Results of Radium and X-ray Therapy in Malignant Disease, E. & S. Livingstone Ltd., 1950.
13. British Empire Cancer Campaign: Survey of Cancer in London, 1952.

TWO CASES OF UNILATERAL BLINDNESS FOLLOWING ANÆSTHESIA WITH VASCULAR HYPOTENSION

J. G. GILLAN, M.D., *Toronto*

THE DAY HAS PASSED when the junior member of the hospital staff administered the anæsthetics. Anæsthesia has risen to its proper place as a specialty. With greater complexity of equipment has come the opportunity to help the surgeon more by improving the condition under which he operates. One of these aids is the use of drugs to reduce hæmorrhage. Pioneer work in the field of surgery under reduced blood pressure has been done in Britain. Griffith and Gillies¹ and others, in Edinburgh used spinal block, and Enderby² and Shackleton³ and Rolleston⁴ used methonium compounds.

Hexamethonium is the drug usually considered most reliable; the iodide is preferable to the bromide salt. In this technique the systolic blood pressure is reduced to, and maintained as far as possible, between 60 to 70 mm. of mercury. By tilting the patient, the vital circulation is maintained. The surgeon and the patient both benefit, the former by clearer vision and less delay catching bleeding points, and the latter by less shock from blood loss. So marked is the effect that Shackleton³ thus describes a thyroidectomy—"the thyroid resembled a demonstration of an anatomical dissection". One is tempted to wonder if Shylock might not have obtained his pound of flesh had he known about hexamethonium.

All the exponents of the technique, in spite of enthusiasm, issue warnings that there are certain possible dangers. Shackleton³ lists these:

(1) "Reducing the cerebral circulation below a safe level. In hyperpietics the sudden fall in blood pressure and diminution of circulation might be especially dangerous. (2) Ill effects of reduced circulation on other organs—for example, kidneys. (3) Prolonged effect of hypotension. (4) Postoperative secondary hæmorrhage as the pressure rises again. (5) Danger during the unstable postoperative stage, especially during transport and lifting into bed. (6) Failure to establish hypotension initially, or to maintain it throughout the operation, leaving the patient deprived of normal vascular tone, and liable to increased bleeding."

Shackleton dismisses most of these as theoretical, and blames the rare fatalities on errors of technique. This seems to have some support from the figures quoted by Rycroft and Romanes,⁵ who show how a large series can be conducted

relatively free from incident, and with very marked advantages.

However, the annotation on Shackleton's article⁶ strikes a balanced warning. "It is for the individual anæsthetist to weigh the dangers against his sense of duty for providing the surgeon with a comparatively bloodless field. The less experienced anæsthetist would certainly be advised to keep local bleeding moderately controlled by maintaining a clear airway and providing sufficient oxygen, and to resist the surgeon's demands for perfection". Grimson *et al.*,⁷ in quoting the Council of Pharmacy and Chemistry, emphasized the dangers of the use of ganglion blocking drugs especially in cases where partial obstruction of cerebral or coronary arteries was present.

Visual symptoms on administration of hexamethonium orally in hypertensive patients, have been noted by Schroeder.⁸ These consisted of blurred vision in hyperopic patients, and sluggish pupil reactions with photophobia. Mackey and Shaw⁹ in a series of 15 cases treated by hexamethonium bromide orally found that "almost all patients state that methonium therapy weakens the power of accommodation, so that it may be difficult, for example, to read a newspaper". Turner¹⁰ reports that with the use of methonium compounds blurring of vision from paresis of accommodation is common and may be persistent.

Kay and Smith¹¹ noted a suffusion of the conjunctiva as a constant feature. This is probably due to the histamine-liberating action of hexamethonium recorded by Macintosh and Paton.¹² Burt and Graham¹³ noted that the pupils were slightly dilated in all cases, but the pupil reactions remained brisk. However, after methonium compounds have been used in association with anæsthesia, the pupil is frequently dilated, and the patient blind for two hours, after which the vision returns to normal.¹⁴

Two cases are presented where irreversible eye changes occurred associated with vascular hypotension during major surgical procedures.

CASE 1

L.Z., male aged 26 years, was under observation at the Oshawa General Hospital for a renal complaint diagnosed as left pyelonephritis with lithiasis. The laboratory findings are summarized as follows: N.P.N. 44-50 mgm. % Urine; albumin a trace. Pus cells 20-40, red cells 3-5, calcium oxalate crystals. Ps. pyocyaneus cultured. Blood: White corpuscles, 11,200. Differential, normal limits.

On October 29, 1952, an operation was performed on the left kidney. A calculus was found impacted in the upper end of the left ureter, the whole kidney being inflamed, and full of pus. The calculus was removed, the ureter and pelvis irrigated, a nephrostomy performed with the insertion of a mushroom catheter.

The anaesthetic was by Gillies method, using a pento-thal induction with Novocain and Nupercaine mixture for the spinal block. The blood pressure dropped from 120 to 70 mm. of mercury in 20 minutes, and was maintained at this level for one hour and five minutes. The pressure rose to 110 mm. mercury after one hour and forty minutes. No pressor drug was required. Good oxygenation was maintained throughout. On recovery of consciousness it was discovered that there was loss of vision in the left eye.

I was asked to report on this condition on October 31. The right eye was normal in vision, appearance and tension. The left eye had no light perception, and was congested and tender. The pupil was small, and dilated sluggishly and partially with cocaine and neosynephrine 10%. The anterior chamber was shallow. Some ointment had been used in the eye just prior to the examination. This could not be completely removed, and so the examination of the fundus was difficult. A large white area of retinal oedema could be seen around the disc and macula, across which vessels passed. A "cherry red" spot could be dimly made out at the macula, through the haze. The intra-ocular tension was very low, not being measurable by the tonometer. The diagnosis of central retinal artery occlusion was made. There has been no restoration of vision since, and pallor of the optic nerve is now becoming apparent.

CASE 2

E.R., aged 48, white female, was examined on October 31, 1953, at the Oshawa General Hospital. She had undergone an operation on the previous day for bowel obstruction. She was found to have a metastatic carcinoma from a primary at the hepatic flexure, and a large resection of the bowel was carried out. The right ovary, which was also involved, was removed.

The anaesthetic was by Gillies method using a Novocain and Nupercaine mixture, as in the previous case. The systolic blood pressure prior to the anaesthetic was 165, which dropped in fifteen minutes to 55 mm. mercury. The pressure remained at this level for one hour and forty minutes. After two hours it dropped to 50 mm. mercury, when Methedrine 10 mgm. was given. The pressure rose to 100 after two hours twenty minutes from start of operation.

On return to the ward she reported that she could not see with the left eye. On examination the right eye was found to be normal. The vision in the left could not be accurately assessed owing to the condition of the patient. Hand movements were detected. The left pupil reacted sluggishly to light, but dilated fully with cocaine and neosynephrine. The media was clear. The macula showed some serous swelling, and there was some oedema between the disc and the macula. No actual arterial occlusion was found.

The patient died on the fourth day after apparently making good progress. Permission for a post-mortem was obtained, but did not include the head, although this was requested. It was, therefore, not possible to obtain the pathological background of the clinical findings.

Discussion.—If the first case had occurred alone it might have been thought to be due to embolism, for, as one attending physician remarked, "he was a good candidate for it". However, in view of the occurrence of amaurosis in the left eye of two patients operated upon on successive days under anaesthesia by the Gillies

method, some concern was expressed as to whether this could be a complication of the technique. It seemed doubtful as quite a large series of cases had been cared for by this method at Oshawa Hospital without incident.

A review of the pertinent literature was attempted to discover if blindness had been recorded previously in association with induced hypotension. The result is given in the preamble. It seems that hypotension, either by Gillies method or using methonium compounds, has not resulted in the expected complications. A record of permanent eye damage was not found in the literature.

A review of the technique employed in the above cases was made by the anaesthetic staff. It appears that new equipment had been ordered, and only partially supplied. Thus new rubber head straps were used in conjunction with an old face mask. It is probable that these exerted undue pressure on the left eye.

Pressure on an eye during anaesthesia is not an uncommon cause of unilateral blindness, although it is not stressed in books upon the subject. Some do not even mention the possibility, while Hewer¹⁵ states that diminished intraocular tension followed by a reactional rise producing acute glaucoma may follow the prolonged application of an ill-fitting face piece pressing on the globes. That the cause of the condition is now being recognized more frequently is evidenced by the articles of Slocum *et al.*,¹⁶ and Givner and Jaffe.¹⁷ The former records one case of retinal thrombosis following pressure upon the eye by a Bailey head rest during a neuro-surgical procedure. This was particularly serious as it was the patient's only seeing eye. The second article lists four cases of occlusion of the central retinal artery following anaesthesia. On consultation with colleagues at least five other attested cases have been discovered from various medical centres. None of these cases were associated with surgery in the hypotensive state.

What, then, if any, is the rôle of the reduced systolic blood pressure in these cases? It is emphasized that the retinal artery is an "end-artery", and that the blood enters the eye against the pressure of the intraocular tension. That this equilibrium is easily upset is proved experimentally by the transient blurring of vision which occurs after gentle pressure on one eye. When the systolic pressure drops markedly, the excess of the retinal arterial pressure over the

intraocular pressure is reduced, so that even slight external pressure may arrest the circulation and allow the occlusion retinal arteries.

That this is not the whole picture is evidenced by the work of Cameron and Burn,¹⁸ who showed that the intra-ocular pressure also fell when the blood pressure was reduced by hexamethonium in glaucoma patients. Rycroft and Romanes⁵ state, "In the normal eye, it can be demonstrated that the intra-ocular pressure may fall from 25 to 18 mm. of mercury under basal anaesthesia, but with postural hypotension the intra-ocular pressure cannot be registered on the Schiötz tonometer and the cornea will remain concave until it is manipulated back into shape."

SUMMARY

Two cases are presented of left sided blindness following anaesthesia with Gillies spinal block technique.

The literature referring to hypotension as a surgical aid, with special reference to eye complications is discussed. The freedom from serious accident in so radical a procedure is remarkable. No similar cases of blindness occurring in patients cared for under this technique have been found.

Pressure on the eyeball is the most likely cause of the complication, and this occurs not infrequently when no reduction of systolic pressure has been induced. This complication is to be stressed, as blindness is a very heavy price to pay for, possibly, a relatively minor operation. The rôle of spinal blocking agents in making the patients more susceptible to such external pressure by upsetting the equilibrium between retinal arterial and intra-ocular tension is discussed.

I wish to thank Drs. Glazier, Smith, Sturgis and Tomlinson for permission to discuss these cases and use their notes.

REFERENCES

1. GRIFFITHS, H. W. C. AND GILLIES, J.: *Anæsthesia*, 3: 134, 1948.
2. ENDERBY, G. E. H.: *Lancet*, 1: 1145, 1950.
3. SHACKLETON, R. P. W.: *Brit. M. J.*, 1: 1054, 1951.
4. ROLLESTON, W. N.: *Brit. M. J.*, 1: 1147, 1951.
5. RYCROFT, B. W. AND ROMANES, G. J.: *Brit. J. Ophth.*, 36: 29, 1952.
6. Annotation: *Brit. M. J.*, 1: 1069, 1951.
7. GRIMSON, K. S. et al.: *J. A. M. A.*, 149: 215, 1952.
8. SCHROEDER, H. A.: *Arch. Int. Med.*, 89: 523, 1952.
9. MACKAY, W. A. AND SHAW, G. B.: *Brit. M. J.*, 2: 259, 1951.
10. TURNER, R. W. D.: *Practitioner*, 167: 541, 1951.
11. KAY, A. W. AND SMITH, A. N.: *Brit. M. J.*, 1: 459, 1951.
12. MACINTOSH, F. C. AND PATON, W. D. M.: *J. Physiol.*, 109: 198, 1949.
13. BURT, C. C. AND GRAHAM, A. J. P.: *Brit. M. J.*, 1: 462, 1950.
14. MACKAY, I. M.: Personal communication.
15. HEWER, C. L.: *Recent Advances in Anaesthesia and Analgesia*, Blakiston, 6th ed., 1948.
16. SLOCUM, H. C. et al.: *Surg., Gynec. & Obst.*, 86: 729, 1948.
17. GIVNER, I. AND JAFFE, N.: *Arch. Ophth.*, 43: 197, 1950.
18. CAMERON, A. J. AND BURN, R. A.: *Brit. J. Ophth.*, 36: 482, 1952.

BLOOD VESSEL SURGERY*

GORDON MURRAY, M.D., F.R.C.S.[C.],
F.R.C.S.(Eng.), Toronto

IN ANCIENT TIMES surgeons learned to control hæmorrhage by packing or compression of a wound, or by constriction of an extremity proximal to the site of injury. Later it was learned that heat would affect bleeding and various forms of heat, such as cautery, were used. Preceding and during Hunter's time, with the great advances in surgery for that period, it was learned that ligation of vessels, either at the site of bleeding or remote from the site of injury, would control the hæmorrhage. In the 19th century French surgeons developed vascular surgery, for which great opportunities were pro-

vided by the numerous wars in the Europe of those days and since. These surgeons repaired vessels by end-to-end suture and were the first to apply venous grafts to bridge gaps in arteries. The accounts of these operations give fine details of the procedures but there are no recorded successes. The results reported all indicated failure because of clotting and plugging of the venous graft area. During the First World War, Carrell developed a technique by which he could do vascular repair without using anticoagulants. For many years Matas, pioneer in repair of aneurysms, did other excellent work on blood vessels which was continued by his protégé Reid.

The first consistently good results from the use of venous grafts to bridge gaps in arteries were reported by the author.¹ Success in these experimental and clinical cases was directly attributable to the use of anticoagulants, at that time

*Read before the annual meeting of The Royal Australasian College of Surgeons, Wellington, N.Z., September, 1951.

heparin. Further advances in vascular and cardiac surgery and in the care of numerous vascular diseases, including coronary thrombosis, have been the result of the use of anticoagulants as advocated by the author during the early work on the development of heparin.²

The consideration of the surgery of blood vessels divides itself into two sections: (1) Injuries of vessels; and (2) Degenerative lesions, as a separate entity.

Regarding injuries, these should be divided into (1) contusion with damaged intima with thrombosis, but from the surface the vessel may appear to be intact. (2) Incomplete division (a) with hæmatoma (b) with external hæmorrhage. (3) Complete division. (4) Loss of a segment of an artery. The first consideration under any of these conditions obviously is the control of hæmorrhage and the resuscitation of the patient if that should be necessary.

Next comes the period of observation to determine if the peripheral circulation is adequate. If it is good enough, or if it is doubtful, there should be a period of waiting, because frequently when the circulation is doubtful, it will improve over a period of three to four hours and during this time, assistance in any form must be rendered, such as sympathetic nerve block, novocaine intravenously, placing the extremity in a dependent position,⁷ application of heat, possibly the use of pavex or other mechanical aid. On the other hand, if the extremity is pulseless, cold, insensitive, paralyzed, white or blue, either in the presence of a closed injury with a local hæmatoma or with an open wound, immediate action should be undertaken. It is essential to be fully aware of the later course of such trouble when the above mentioned findings are present. Under these conditions, one must conjure up, not the immediate appearance of the extremity but what it will look like in two or three days. Under the conditions described, it will go through progressive changes until in a few days it will be black and will declare itself as gangrene even to an unskilled observer. However, the surgeon must anticipate this and act while there is still a possibility of accomplishing something to avert the impending disaster. While it is not a difficult procedure to accomplish something in the early stages following such injury, if left more than a matter of a few hours, perhaps eighteen to twenty-four hours at the most, the prospects for recovery by operation

are almost nil. This is because, if the tissue is badly devitalized, it will undergo rigor mortis from which there is no recovery. Moreover, thrombosis and clotting will spread throughout the peripheral vascular tree, following which repair of the vessels will be of no value.

When, therefore, it has been decided within a few hours that the circulation to the extremity is badly impaired or endangered, exploration should be undertaken immediately. It is much the safer procedure, will save many extremities and the prospects from doing the necessary procedure in good time are excellent.

1. An incision should be made along the course of the main vessels at the site of the hæmatoma. When the hæmatoma is cleared, the vessels should be dissected out, the site of bleeding controlled and the injury identified. If the vessel has been contused, determine the point at which the pulsation disappears. If pulsation is absent below the site of contusion, the vessel should be divided across at the site at which it is badly contused and not pulsating. If it is found to be occluded as has been suspected, a necessary amount of vessel should be resected above and below to expose healthy arterial wall.

2. If the vessel is perforated and not divided, it may be possible after removing clots if any, to repair the perforation or lateral laceration by a few stitches and leave the vessel in good condition.

3. If the vessel has been divided, identify both ends and determine if there is a segment missing. If the ends are cleanly divided, after removing clots, they may be closed very simply by everting mattress sutures. The vessels are elastic and tend to retract but by appropriate handling, the ends can be approximated and sutured to give a blood-tight suture line. If the ends are plugged with clots, they must be cleared and trimmed back until healthy vessel wall is evident at both ends. If the ends come together neatly, they may be sutured. If there is a gap the better plan in major vessels is to apply a venous graft or an arterial, if one is available from a vessel bank. The graft may be applied by using Payr's or Blakemore's tubes, but the general feeling now is that the suture method, as advocated by the author in 1935,³ and others, is the better method. Heparin should be instilled in the ends of the vessel on all occasions and in the graft when the repair is in progress and regional or general heparinization continued postoperatively. Re-

gional heparinization as advocated first by the author⁴ can be applied by inserting a needle or a polythene tube with the end upstream in the proximal segment. This requires a good pump to be sure that the heparin is being delivered against the arterial blood pressure. General heparinization works quite satisfactorily. Heparinization should be continued for about seventy-two hours in simple repairs, as demonstrated by the author⁵ in the early experimental work, and when a graft is used, it should be continued for not less than eight days.

From early experimental work, it was demonstrated that venous grafts and later arterial grafts survived, became vascularized and continued to function for long periods.⁶ One venous graft applied in the carotid artery of a dog functioned satisfactorily for nine years and following removal was shown to be patent and working satisfactorily. Venous grafts in major arteries in human beings applied by the author have survived, the longest being seventeen years with many others down to the present time. I have applied three arterial grafts in the aortæ of human beings after resection of aneurysms, seven inches, five and a half, and four inches in length and there is evidence to suggest that these functioned satisfactorily. When, therefore, there is direct injury to an extremity or otherwise, such as a crush, contusion, fracture, dislocation or open wounds, the possibility of injury to major vessels must be considered. If the circulation to the extremity is doubtful, early operative exploration of the involved vessels must be undertaken.

The next and frequently occurring problem is one of embolism in major vessels. These occur most commonly following heart disease such as mitral stenosis with auricular fibrillation and auricular clots, or following coronary thrombosis with mural thrombi, any of which may be detached and thrust into the aorta from which they travel to the peripheral vessels. If they miss the carotids, they may go to the upper extremities but more commonly to the femoral vessels. Occasionally the mesenteric and visceral vessels are involved, but the most serious and common effects are seen in the leg. Following such an acute accident, there is sudden loss of colour, of heat, of pulsation, of sensation and of motion in the extremity. Thrombosis of an arteriosclerotic vessel will give similar effects, but these come on slowly over a period of time with symptoms

lasting hours or perhaps days or weeks preceding the complete occlusion. Again one must be aware of what will be the later appearance of an extremity so involved. While some cases with embolism survive and re-establish sufficient circulation, many of them develop gangrene for which amputation is necessary.⁷ If, however, the condition is recognized early, and the embolus removed, the extremity can be restored to its original state and within ten or twelve days the patient, if ambulatory, can be about as usual. The operation is a very simple one which frequently can be done under local anæsthesia, the clot identified, the vessel opened and the clot removed, the area heparinized and the incision sewn up. The results are dramatic to the on-lookers, satisfactory to the patient, and gratifying to the surgeon.

The next interesting division of this subject is that of aneurysm. Here the effect may be traumatic in origin in which there has been a puncture of a vessel such as in war wounds giving either simple saccular aneurysm or arteriovenous aneurysm. These, if of fairly long duration, can usually be excised with double ligation in the former, quadruple ligation in the latter and a good result expected, although in some, such as the carotid, repair is preferable. In the degenerative vascular diseases where there are either saccular or fusiform aneurysms, the prospects are not good. The tendency is for these aneurysms to enlarge and a fair number of them rupture causing rapid fatal hæmorrhage. Matas, with the methods of vascular repair available at that time, repaired such aneurysms with the material available at the site. Other methods of eliminating the effects of the aneurysms were developed. More recently with the use of venous and arterial grafts, aneurysms, especially of the aorta, have been resected and replaced successfully by arterial grafts. At present only those in the thoracic aorta or below the renal vessels in the abdominal aorta are suitable. If, however, the aneurysm is such that it does not lend itself to excision and repair, the ancient procedure of wiring is of value. The purpose of this is to cut down the circulation through the aneurysm and promote thrombosis within it. Constriction of the vessel above or of the aneurysm itself by cellophane is useful. Cellophane applied here and there over the surface at the weaker spots may increase the fibrous layers on the outside and give further support.

In degenerative arterial disease with thrombosis, with acute symptoms of occlusion or with longer standing symptoms as a result of impaired circulation, attempts have been made to clear these areas and restore the main trunk. In a recent personal communication, the French surgeons have cleared such vessels in 52 patients with failure in 50, only two remaining patent, as far as they could determine by arteriograms. While in some cases some improvement can be expected, as reported by Freeman and others, such operations have a very limited application in these advanced arterial diseases. Unquestion-

ably, the better approach in future for these conditions is a study and control of arteriosclerosis.

REFERENCES

1. MURRAY, G.: Heparin in Surgical Treatment of Blood Vessels, *Arch. Surg.*, **40**: 307, 1940.
2. *Idem*: Some Experimental and Clinical Aspects of the Use of Heparin, *Surg., Gynec. & Obst.*, **70**: 246, 1940.
3. MURRAY, G., JAKES, L. B., PERRET, T. S. AND BEST, C. H.: Heparin and Vascular Occlusion, *Canad. M. A. J.*, **35**: 621, 1936.
4. MURRAY, G. AND BEST, C. H.: Heparin and Thrombosis (The Present Situation), *J. A. M. A.*, **110**: 113, 1933.
5. MURRAY, G.: Heparin in Thrombosis and Embolism, *Brit. J. Surg.*, **22**: 616, 1940.
6. *Idem*: Heparin in Thrombosis and Blood Vessel Surgery, *Surg., Gynec. & Obst.*, **72**: 340, 1941.
7. MURRAY, G., SIMPSON, J. S. AND WATERS, N. A.: Treatment of Extremities Following Sudden Failure of Circulation, *Surgery*, **20**: No. 3, 1946.

EXPERIENCE IN PULMONARY RESECTION FOR TUBERCULOSIS

ELLIOTT HARRISON, M.D., F.A.C.S.,
G. D. SAXTON, M.D., F.R.C.S.(Edin.), and
W. J. McLAREN, M.B., F.R.C.S.(Eng.),
Vancouver

PULMONARY RESECTION as a treatment for tuberculosis is increasing in frequency to such an extent that we should know what end results we are obtaining in our own cases, under our own conditions, in order to enable us to give more intelligent advice in the future. The cases used for information in this paper are entirely from those treated in the Willow Chest Hospital of the Division of Tuberculosis Control, and the routine of treatment and investigation described are those used in that unit.

Patients who have been referred for major surgery of any kind, by the general staff meeting, all receive a very careful medical assessment from an internist who is attached to the surgical floor and also by a man skilled in pulmonary function tests. When all these data are available, the case is thoroughly discussed at a surgical conference, at which the internist, the physiologist, the director of the unit, as well as the whole surgical staff, are present. The decision is then made as to the desirability of surgery, and as nearly as possible, exactly what should be done.

With an occasional exception, due to special circumstances, wherever collapse therapy appears likely to be successful we advise that as a primary procedure. We are still convinced of the value of a good pneumothorax managed by

a competent physician, but by the time a patient reaches the surgical floor, the possibilities of this therapy have been exhausted. There are certain lesions which we feel can not be successfully treated by collapse therapy, and on these a primary resection is done.

Table I shows indications used in this series. There are certain cases which have had some type of treatment which has not been adequate to control the disease. From the type of reaction or progress under the initial therapy we believe we can conclude in many that no other treatment will be of value except pulmonary resection.

TABLE I.

INDICATIONS		
Primary:	Pneumonectomy	Lobectomy
1. Lower lobe cavitation.....	6	16
2. Hilar cavity.....	1	7
3. Giant cavity.....	1	2
4. Tuberculous bronchiectasis..	1	2
5. Tuberculoma.....	—	16
6. Bronchostenosis.....	11	5
7. Destroyed lung.....	6	—

Table II shows our secondary indications. Only three cases did not fall into one or more of the indications, and these are shown in Table III.

Many patients are receiving streptomycin when they come to the surgical floor and of course this is continued both before and after their surgery. Those who are not receiving it when the operation is slated receive 1 gm. a day for 2 days preoperatively, and postoperatively receive it every other day for 2 weeks, then twice a week for varying lengths of time, and we are tending to increase the duration of the course

of streptomycin. P.A.S. is administered with the streptomycin. All receive S.R. penicillin 1 c.c. the morning of operation, then postoperatively receive crystalline penicillin every 3 hours for 2 days, then S.R. penicillin daily for about a week.

The cases reported here are the first 100 consecutive cases of pulmonary resection for pulmonary tuberculosis; 33 pneumonectomies and 67 subtotal resections done in Vancouver, completed by September 15, 1951, and reviewed as of March 15, 1952. Records of all were available, very few of the latest records were over 6 months old. They were done by three different surgeons in all, but approximately 90% were done by two of us. All patients were done under cyclopropane anaesthesia, given either intratracheally or endo-

TABLE II.

INDICATIONS		
Secondary:	Pneumonectomy	Lobectomy
8. Failed thoracoplasty.....	9	6
9. Failed pneumothorax.....	13	32
10. Failed extrapleural pneumothorax.....	—	—
11. Haemoptysis.....	—	3
12. Miscellaneous.....	3	—

TABLE III.

Miscellaneous:
Hydropneumothorax
Haemothorax and atelectasis right lower lobe
Spontaneous hydropneumothorax

bronchially. Almost all were done in the conventional lateral position, the exceptions being done in the Overholt face down position. The postero-lateral approach has always been used, in lower resections usually through the bed of the resected 7th rib, and in upper resections and pneumonectomies through the bed of the 6th, 5th or occasionally the 4th. Long lengths of rib are removed, and latterly in only a few cases have we found it necessary to cut ribs above or below. The intercostal nerves of the rib above and below as well as that of the resected rib, are injected with 2% novocaine and 2 c.c. of 5% intracaine in oil. We believe this diminishes postoperative pain for two days to a week and occasionally seems to almost eliminate it. The resection is done by the generally accepted individual ligation technique. The bronchus is closed with either No. 0 chromic catgut or No. 0 black silk, and occasionally both are used.

Postoperatively, as soon as the anaesthetic has been finished, the patient's tracheobronchial tree is thoroughly aspirated through the intratracheal tube, and an oxygen mask receiving supply from a small tank is put on and kept on during the whole time of the patient's transfer from the operating room to the nearby post-anaesthetic recovery room where a mask, attached to a large tank, is substituted till the patient is conscious or quite restless, when he is put in an oxygen tent at 13-14 litres per minute and kept there continuously for 24 hours, and almost continuously for the next 24 hours. Patients are fed as soon as they can tolerate food and as much as they can take.

Patients who have resection of an appreciable volume of lung removed, have a collapse procedure done as well. A few of the later ones have had the collapse done at the same time as the resection and these have all done very well. Usually, from 3 to 6 weeks after the resection, upper resections and pneumonectomies have a modified thoracoplasty done, which consists of removal of ribs 2-4 or 5 inclusive, and the stripping of periosteum from the under surface of the first rib. No attempt is made to carry the removal of rib as far back as the transverse process. We find this modified procedure causes much less pain and shoulder symptoms than the conventional operation, and yet diminishes the volume of the thorax considerably as seen by comparing x-rays before and after. Lower lobe resections have a phrenicotomy done 2-3 weeks after the resection. It is not done at the time so the persisting movement of the diaphragm will help expand the remaining portion of lung. Patients are kept at complete bed rest for four months following their resections.

Many patients had more than one indication.

Table IV shows the number of multiple indications in the lobectomies, and Table V the number among the pneumonectomies.

We have regarded a postoperative death as any one occurring within 6 weeks of operation.

There were no postoperative deaths among the lobectomies.

The total deaths among the lobectomies from 6 months to 5½ years postoperative was 6 deaths, a mortality rate of 9%, the male death rate being much higher than the female.

In the pneumonectomies, there was a total of 8 deaths in from 6 months to 5½ years, a mortality rate of 24%, again the women doing much

better than the men. All the late deaths in the series were due to spread of tuberculosis, except one, 2½ months after operation due to coronary occlusion.

Table X shows the main indication for opera-

TABLE IV.

LOBECTOMIES
49 patients had one indication
14 patients had two indications
4 patients had three indications

TABLE V.

PNEUMONECTOMIES
18 patients had one indication
13 patients had two indications
2 patients had three indications

tion. Destroyed lung, as in most series, gave the highest mortality, four out of six cases died.

Table XI shows the postoperative complications. Of these, broncho-pleural fistula among

TABLE VI.

POSTOPERATIVE DEATHS (within 6 weeks of operation)
Pneumonectomies..... 3
1 in 24 hours due to hæmorrhage, 43 year old man.
1 in 4 days due to pulmonary tuberculosis, 37 year old woman.
1 in 21 days due to pulmonary cedema, 58 year old man.
Lobectomies—No postoperative deaths.

the pneumonectomies was the most frequent and most serious. The empyemas among the lobectomies were all localized ones.

TABLE VII.

MORTALITY
Lobectomies—6 deaths in 67—9%
37 females with 2 deaths, Mortality 5%
30 males with 4 deaths, Mortality 12%

The laryngeal nerve injury occurred in a young Japanese woman who had been ill for 14 years and who had a very extensive bronchial stenosis. Dissection of the bronchus was difficult

TABLE VIII.

LOBECTOMY DEATHS
Main indication for operation:
Failed pneumothorax..... 1
Failed thoracoplasty..... 3
Hæmoptysis..... 1
Lower lobe cavitation..... 1

from the chronic inflammation and the nerve must have been in the scar tissue. Outside of this complication which gives her little disability, I am thankful to say she has done very well.

TABLE IX.

MORTALITY
Pneumonectomies 8 deaths in 33—24%
19 females with 2 deaths, mortality 15%
14 males with 6 deaths, mortality 43%

In reviewing the relationship of broncho-pleural fistulæ to deaths, it is noted that; in the pneumonectomies, of eight cases, 5 are dead, 4 of their chest disease and one of T.B. meningitis. Of the three living, one is on full exercise, one is in good condition in hospital with an occasional, superficial abscess following extensive

TABLE X.

PNEUMONECTOMY DEATHS
Main indications for operation:
Destroyed lung..... 4
Large lower lobe cavity..... 1
Failed thoracoplasty..... 2
Bronchostenosis and atelectasis..... 1

thoracoplasty, and one is dying of extensive disease on the contralateral side. These cases all fell within the "poor-risk" group. It seems to us that the danger of fistula is greater in this type of patient whom we are attempting to salvage. Once a fistula has developed, resistance is so poor that the outlook is very grave. In lob-

TABLE XI.

POSTOPERATIVE COMPLICATIONS
Pneumonectomies Lobectomies
Broncho-pleural fistula
and empyema..... 8 4
Empyema..... 1 6
Spreads..... 4 4
Atelectasis..... 1 3
Hæmorrhage..... 1 0
Bronchial stump ulcer..... 1 3
Laryngeal nerve injury..... 1 (left side) 0

ectomies, of the four fistulæ two occurred in "poor-risk" cases, both of whom died. The two fistulæ in the cases who are alive were in young people in whom we would have expected the results to be good. They have survived but have had, or will have, additional surgery with greatly increased morbidity.

Table XII shows that there was not much change in the relation of pneumonectomies to lobectomies until the first 9 months of 1951, during which time we were inclined to advise resection earlier and as a consequence the resections were less radical.

Table XIII gives an idea of the distribution of the resections. You will see we operated considerably more often on the right than on the left; 49 on the right and 18 on the left. There are no bilateral resections in this series though we have had some since.

TABLE XII.

INCIDENCE OF TYPE OF OPERATION			
Year	Pneumonectomies	Lobectomies	Total
1946.....	1	2	3
1947.....	2	5	7
1948.....	5	11	16
1949.....	10	15	25
1950.....	8	15	23
1951..... (9 months only)	7	19	26
Total.....	33	67	100

TABLE XIII.

DISTRIBUTION OF SUBTOTAL RESECTIONS	
Right—Upper.....	22
Upper and middle.....	1
Wedge of upper.....	2
Segmental upper.....	1
Middle.....	1
Middle and lower.....	4
Lower.....	16
Wedge apex lower.....	1
Segmental apex lower.....	1
	49
Left —Upper.....	10
Upper and apex of lower.....	1
Segmental apex lower.....	1
Lower.....	6
	18

Of course the real test of any therapy is how many patients it can put on a self-supporting basis, or at least return to an enjoyable manner of living. One fact should be kept in mind in judging these results, and that is that in almost all cases, no other type of treatment offered any chance of cure. Sputum negative in this series means that three consecutive sputum or gastric washing cultures have shown no growth of tubercle bacilli.

Table XIV gives the results in the lobectomies. We hope that as the time for date of operation

increases, more patients will move into the part and full time work categories.

This is the result in the pneumonectomies. Although the mortality and complication rates are higher with this more radical procedure, it will be seen that the ability to return to gainful employment or exercise is not much different.

In conclusion, it is our impression that pulmonary resection fills a definite place in the treatment of pulmonary tuberculosis and offers a chance of cure to many cases who have no other hope. The mortality is moderately high in our

TABLE XIV.

LOBECTOMIES
Of 67 lobectomies, or partial lobectomies, 61 are alive from 6 months to 5½ years after operation.
Work status of survivors:—20 full time work 13 part time work 16 exercise as desired 12 bed rest
Sputum positive in 11 patients, a conversion rate of 81%.

TABLE XV.

PNEUMONECTOMIES
Of 33 cases, 25 are alive from 9 months to 6 years after operation.
Work status of survivors:—6 full time work 9 part time work 5 exercise as desired 5 at bed rest
Sputum positive in 4 bed rest patients. Sputum conversion in survivors 84%.

initial series, but we believe that with improved techniques and earlier recognition of the indications for operation, this can be considerably lowered. It is too early yet to draw conclusions as to what the long term results will be, but it would seem that the results to date indicate pulmonary resection is filling a real part in the therapy of tuberculosis. With the increasing safe use of subtotal resections, I believe that we are likely to increase the indications for its use, particularly in extending it to include multiple small resections either unilaterally or bilaterally.

I feel certain that there is no more impressionable student in the world than the medical student. If these students are asked why they decided on medicine as their life work, most will say that a highly respected practitioner, a close relative of the family or the family physician was their ideal. They enter medical school with this idealism largely untarnished. To the greatest degree possible it should be preserved.—Watson, E. H., *J. Med. Education*, 28: 15, 1953.

TUBERCULOSIS OF THE SUPERFICIAL LYMPH NODES*

GODFREY L. GALE, M.B., F.R.C.S.(Edin.),
Weston, Ontario

SCROFULA has a long and honourable history. There is some evidence to suggest that Clovis, king of the Franks in the 5th century was the first to practise healing of this so-called "king's evil". Edward the Confessor probably introduced the cult into England when he came to the throne in 1042, and for the next 650 years the kings and queens of England and France rivalled each other in their ability to cure this disease. In England the cult reached its height under Charles II. He is said to have treated 10,000 cases a year with his royal touch and to have presented each victim with a golden medallion called an "angel", which no doubt compensated those that went away disappointed and also no doubt increased the popularity of the throne. The cult died with Queen Anne. One of the last persons to be treated was Samuel Johnson, then an infant. Unfortunately Queen Anne's touch had no effect and his scrofula went on discharging many years.

The best early account of the disease is by Richard Wiseman.¹ He was born in 1622 and served under Charles I, the Commonwealth and Charles II. He vouches for many hundreds of cures by Charles II. He described tuberculosis of the cervical, axillary and inguinal nodes, noted the frequency of enlarged mesenteric nodes in children, and noted the association of this disease with epididymitis and with caries of the bones and joints, though in the latter case he must have found it hard to distinguish between tuberculosis, syphilis and pyogenic osteomyelitis. He states: "tendons are sometimes involved with a great gumminess and collection of Strumous matter, especially the fingers, hands, feet and toes". He noted also that overgrown tonsils were frequently "Strumous" and himself performed tonsillectomy.

Treatment, however, remained largely medical and hygienic until 70 years ago, when in 1882 the London physician Sir Clifford Allbutt persuaded his surgical colleague T. P. Teale to commence radical dissections of diseased nodes.² This was the beginning of a great vogue for skilful block dissections which reached its peak in the first two decades of the present century. In 1916, Charles N. Dowd³ of New York published his classical paper of the results on 687 patients he had operated upon during the previous 22 years. He believed in early and radical removal and usually did a tonsillectomy as well. The presence of tuberculous pus was no bar to operation as he found it had little tendency to infect healthy tissue. Most of his patients were between the ages of 5 and 16, and 30% were infected with the bovine bacillus. The patients in which the disease was limited to the upper jugular nodes did the best, while those in which there was a generalized involvement of the nodes had a lower resistance and a poorer prognosis.

Following the end of the first world war, the pendulum swung away from radical surgery to conservative methods of treatment like heliotherapy, x-rays, tuber-

culin and calciferol. More recently, however, it has tended to swing back again. In 1945 Hamilton Bailey⁴ published the results of operation on 686 cases with collar-stud abscesses and skin involvement, and in all he has now⁵ operated on well over 1,000 cases. In the United States, Charles W. Lester^{6, 7} is an advocate of complete removal, not in the acute phase but as early as is considered safe and if possible while nodes are still discrete. In the past six years, the use of streptomycin and para-amino salicylic acid and more recently isoniazid, have again altered our approach and the pendulum will doubtless swing to a fresh point of equilibrium.

This paper is an analysis of all the cases of tuberculosis of the superficial lymph nodes discharged from the Toronto Hospital for Tuberculosis, Weston, in the 20 year period from July 1, 1932 to June 30, 1952. Tuberculosis of the thoracic and abdominal nodes form a separate subject and their surgical importance is limited to certain complications that may arise. These cases are not included in this report.

INCIDENCE

Over the past 20 years there have been in this sanatorium 210 cases. We seem to be treating an increasing number of these cases as the

TABLE I.

Period	PERCENTAGE INCIDENCE		
	No. of cases	Total discharges	Percentage of discharges
1932-42	73	4,383	1.7%
1942-52	137	4,836	2.8%
Total period 1932-1952	210	9,218	2.3%

total number of patients treated in the sanatorium and the number discharged have remained relatively stable. This apparent increase may perhaps be accounted for by the better hospital records that are kept nowadays and by an increased realization that cases of tuberculous lymph nodes need sanatorium care. The death rate from tuberculosis in the Province of Ontario fell to 9.5 per 100,000 in 1952 and it is unlikely that there is a real increase in the incidence of any particular form of the disease. Only long term statistical analysis can settle this point. The actual incidence of tuberculous lymphadenitis in this Province is very small. In the five year period 1947-51 the Gage Institute Chest Clinic in Toronto⁸ made 79,322 clinical examinations of the chest in tuberculosis suspects. Only six cases of tuberculous lymphadenitis were found, that is less than 1 in 13,000 even in this group of tuberculosis suspects. This low incidence must be attributed in part to the fact that since 1938 all milk sold in the Province (apart from a few

*From the Toronto Hospital for Tuberculosis, Weston, Ont.

small outlying communities) has been pasteurized, and that in addition 95% of the herds in the Province have been tuberculin tested with the destruction of all reactors. Thus bovine infection of the lymph nodes from tuberculous milk has now been virtually eliminated.

Sex.—The incidence of the disease in the two sexes does not reveal anything significant. There were 100 male cases (47%) and 110 female cases (53%).

Age.—The maximum age incidence is in the 15-29 group. There were only 30 cases (14%) in children under 15. This is in marked contrast to the experience of physicians at the turn of the century when this was regarded as pre-eminently a disease of childhood. This is unfortunately still true in countries where much of the milk sold is infected with the bovine bacillus. In this Province, however, where the cases are nearly all due to the human bacillus, the age incidence now tends to correspond—as would be expected—with the *general* age incidence of tuberculosis. This change in the age incidence is a striking tribute to the effectiveness of public health measures. In the tuberculosis division at Bellevue Hospital, New York, 5% of the children and 1% of the adults have tuberculous lymph nodes⁶ which is an even lower overall incidence than in this series.

Race.—There were 25 North American Indians and Esquimaux in this series, that is 12% of the total. They showed the usual low resistance to tuberculosis, with a high incidence of associated pulmonary and extrapulmonary tuberculosis and a marked tendency for the nodes to caseate and break down. Ten of these cases, (40%) died of their tuberculosis.

The negro shows another interesting racial characteristic. There were not enough negroes in this series to be significant but negroes show a tendency to massive enlargement of the lymph nodes and this is true not only in North America but also in Nigeria.⁹

Associated tuberculous disease.—In this series only 25 cases (12%) had no other demonstrable tuberculosis while they were in the sanatorium. A very high proportion had active pulmonary or extrapulmonary disease. Does this mean that uncomplicated cases are treated at home and never reach a sanatorium? On the whole we feel that this is not the case, but that the human type of infection encountered now in the older age groups tends to be associated with tuberculosis

elsewhere in the body. In childhood on the other hand there is a tendency for the disease to be limited to the lymph nodes. There were in addition, other tuberculous complications such as meningitis, peritonitis, pericarditis, enteritis, laryngitis etc. The miliary cases were all before streptomycin became available and they all died. Eleven of the bone and joint and seven of the G.U. cases died, most of them in pre-streptomycin days. It is probable that their lymphadenitis was only one manifestation of an overwhelming infection with tubercle bacilli.

Site.—The cervical lymph nodes were involved in 194 patients, that is in 92%. What is the reason for this predilection? The main reason is clearly the ready portal of entry through tonsils, adenoids and other members of Waldeyer's ring,

TABLE II.

ASSOCIATED TUBERCULOUS DISEASE		
Site	No. of cases	Percentage
Primary type pulm. tbc.....	38	19%
Re-infection type pulm. tbc.....	123	59%
total.....	161	78%
Pleurisy and empyema.....	26	12%
Bone and joint.....	46	21%
G.U.....	17	8%
Miliary.....	8	4%

and occasionally through carious teeth. Tuberculosis of the middle ear and mastoid may also infect the regional nodes. The source of infection here is often positive sputum coughed up into the nasopharynx. All these places have been proved to be foci of tuberculosis. Boyd states that 5% of all tonsils removed are found histologically to be tuberculous,¹⁰ but this is probably no longer true of Canada at the present time. There is a direct lymphatic connection between the adenoids and the nodes of the posterior triangle. The cervical region has a very rich lymphatic bed. It has been estimated that there are some 800 lymph nodes in the body and that 300 of these are in the neck.⁵ It may be that repeated attacks of inflammation from childhood on render the cervical nodes more susceptible to tuberculosis and this may also be one reason why these nodes so often break down and form abscesses.¹¹ It must not be forgotten of course that the mediastinal and perhaps the mesenteric nodes are involved far more frequently than the superficial nodes, but the trouble they cause is less obvious and usually escapes any special attention.

When the resistance is low, the disease may extend from node to node along the lymphatics and become generalized to all regions of the neck. This is the usual reason for a generalized cervical node involvement rather than a blood stream infection. In our experience, noticeable involvement of the superficial lymph nodes in miliary tuberculosis is rare. This generalized involvement of nodes is of serious prognostic importance and carries a high mortality as will be discussed below under Pathology.

The retropharyngeal lymph nodes may also be involved and may break down and form a cold abscess. This has to be distinguished from a paravertebral abscess arising from cervical Pott's disease. It is possible that in rare instances such breaking-down nodes may infect the anterior aspects of the bodies of the cervical vertebrae and initiate Pott's disease, as has been shown by Burke to occur in the dorsi-lumbar region of the

TABLE III.

SITE		
Site	No. of cases	Percentage
Cervical.....	194	92%
Axillary.....	46	22%
Inguinal.....	17	8%
Epitrochlear.....	8	4%

spine.¹² When the lower jugular group *alone* is involved as in 22 of these cases, we must postulate an extension upwards along lymphatics from the mediastinal nodes or perhaps occasionally from lesions in the apex of the lung with obliteration of the pleural space and direct involvement of lymphatics of the parietal pleura. Eighteen of these 22 cases showed evidence of pulmonary tuberculosis or pleurisy. The axillary nodes are probably usually involved in a retrograde manner by extension downwards from the neck and only rarely have we found tuberculosis of the breast or chest wall to infect these nodes. Occasionally they may get infected from tuberculosis of the shoulder or upper extremity. Of the five preauricular cases, four arose through an extension upwards from the upper jugular group but in the fifth case it was the only known tuberculous lesion in the patient. Its source of infection was never discovered but it was excised with apparent cure.

The iliac and obturator nodes may become infected in tuberculosis of the hip joint, and the inguinal nodes may become infected in tuber-

culosis of the knee, ankle or foot, especially after the soft tissues adjacent to the bone have become involved in the process. A biopsy here may be of diagnostic value. In one series reported¹³ the biopsy was positive in 56% cases with tuberculosis of the bones and joints of the lower extremity. One of our cases of inguinal node involvement followed inoculation with B.C.G. on the thigh of the same side, and of course in these cases the use of streptomycin is contraindicated as one does not wish to inhibit the organisms inoculated.

Of the eight epitrochlear cases, six were apparently an extension along lymphatics from the axillary nodes, and one case was the first herald of an early tuberculosis of the carpus. The other was of some interest.

CASE 1

This was a 25 year old nurse on the staff of this sanatorium in 1938. She showed no reaction to an I.C. test using 1/20 mgm. of O.T. She nursed a patient whose sputum contained tubercle bacilli on culture and in December 1938 she burnt her elbow on this patient's radiator and 10 days later the skin broke down and ulcerated, and she developed tuberculosis of the adjacent epitrochlear lymph node. This node formed an abscess and tubercle bacilli were recovered from the pus. Her tuberculin test became positive about six weeks following this accident. Both the skin lesion and the node had healed by the following August and when last seen in December, 1941 she had not developed any other tuberculous lesion.

PATHOLOGY

Involvement of the regional lymph nodes is so characteristic of tuberculosis especially with the primary infection, that one could almost call tuberculosis a disease of the lymphatic system complicated by blood stream dissemination and by marked focal reactions where ever tubercle bacilli are located when allergy develops. Thus the local resistance of the lymphatic system as distinct from the general resistance of the body as a whole, plays an important part in the localization of the disease. As mentioned above, there were 39 cases with generalized involvement of the nodes in the neck, a condition due to an unhindered lymphatic spread from node to node rather than to a blood stream dissemination. Of these, 21 died of their tuberculosis indicating that where the lymphatic system fails to stem the disease the outlook is grave, though the disease in the lymph nodes itself is very rarely the cause of death. An example of this however is reported below.

CASE 2

L.S., a 70 year old white woman was admitted to this sanatorium in May, 1939 with a small tuberculous lymph

node on the right side of the neck. In spite of adequate care including tonsillectomy and ultraviolet light, the tuberculous lymphadenitis steadily extended in the neck and to both axillæ, with multiple abscesses. In May, 1940 she developed a tuberculous abscess in the shaft of the right fibula. In October 1940 this was excised but the operation opened up fresh lymphatic channels. Tuberculosis of the right inguinal nodes developed and the disease extended relentlessly through the external iliac, common iliac and para-aortic nodes to the cysterna chyli and she died. At autopsy massive caseation of these nodes was found, and this was apparently the cause of death. There was no miliary infection present.

The usual course of the disease in the superficial lymph nodes is well known. The organisms are usually carried to the nodes as tiny foreign bodies by the macrophages. The reaction in the nodes is most marked in primary infections. Caseation starts at the periphery of the nodes when the organisms are carried there by the lymphatics but at the hilum of the nodes when they reach them by the blood stream. At first the nodes are firm and discrete but later peri-

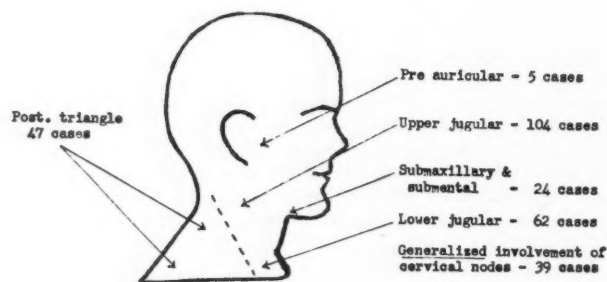


Fig. 1.—Involvement of cervical nodes.

adenitis occurs with matting of the nodes to each other and to surrounding structures. The nodes may become tender and painful and there may be fever and malaise and loss of weight. In adults, especially if the resistance is high, this may be as far as the disease progresses. The nodes become fibrous and later calcified or may become smaller and no longer palpable. It is quite common to see calcified nodes at the root of the neck in chest films in patients who have never been aware they had had lymphadenitis. If the general resistance is high but the local resistance is only moderate, the nodes may go through the familiar process of caseation and abscess formation. The pus is at first confined by the capsule of the node, then by the deep fascia, then only by the superficial fascia till it finally bursts through the skin. A "collar-stud" abscess is a graphic description of such an abscess, with often a surprisingly long neck running through a small opening in the deep fascia to the caseating node beneath. The sinus will discharge for years till the remains of the

caseating node has sloughed out. Left to herself, nature is a poor surgeon, or perhaps she is just more patient than we are. She leaves ugly scars, however. In other cases the lymphatic system seems unable to contain the disease, and it spreads unhindered from node to node either with or against the direction of the lymphatic stream. A rare type is the hyperplastic type, of which we had one example. In these cases the nodes are firm, non-caseating, grey and translucent. There is an endothelial cell proliferation without increase in the lymphoid tissue. Such cases are hard to distinguish from Hodgkin's disease except that the course is benign. Our case was not proved bacteriologically but the nodes

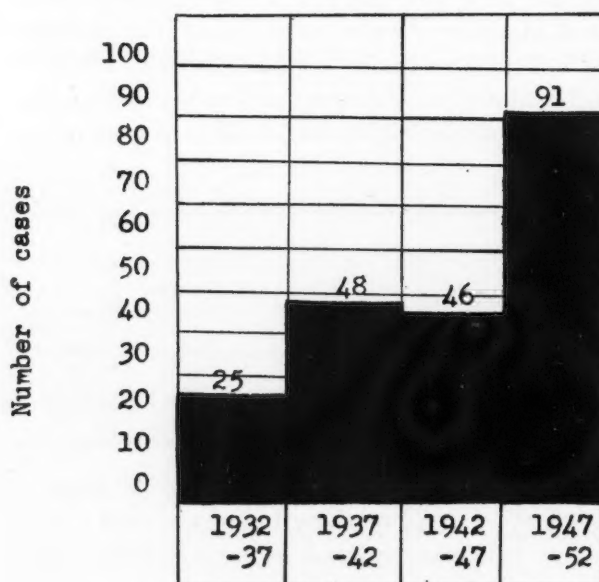


Chart 1.—Incidence in five year periods.

responded dramatically to streptomycin and disappeared.

Diagnosis.—The diagnosis may be very difficult clinically in the early stages. One writer¹⁴ has listed 19 different conditions originally referred to him with a diagnosis of tuberculous cervical lymph nodes. Even in the established case, the diagnosis histologically may be very hard. A recent paper by McDonald and Weed of the Mayo Clinic illustrates this.¹⁵ They divided a series of cases of diseased lymph nodes into three groups. The first group had been reported histologically to be Hodgkin's disease or sarcoid or pyogenic infection of the lymph nodes, but cultures or guinea pig inoculations showed the presence of tubercle bacilli. The second group had been reported histologically to be tuberculosis but cultures showed brucellosis or coccidioides, or chemical analysis showed beryllium.

The third group was also reported histologically to be tuberculous but the most exhaustive cultures and animal inoculations failed to show any etiological agent at all! The only positive proof is the demonstration of tubercle bacilli by culture or guinea pig inoculation but unless there were good reasons to doubt the diagnosis, we would in this situation be prepared to accept acid fast bacilli in a smear of the pus especially if aspirated through the unbroken skin. The bacilli may be very difficult to demonstrate however, except in the acute phase or when an abscess has only recently ruptured. One of our cases illustrates the difficulty in diagnosis and the confusing clinical picture that may sometimes occur:

TABLE IV.

DIAGNOSIS		
Method	No. of cases	Percentage
Culture, guinea pig or smear.....	58	28%
Histology alone.....	64	30%
Clinical evidence alone.....	88	42%

CASE 3

M.H., a white man, developed enlarged cervical nodes at the age of eight. At the age of 12 these were excised and believed to be tuberculous. He remained well till the age of 28 when the nodes recurred. He was given a 30 day course of streptomycin in January 1949 and the nodes became smaller. Residual nodes were then excised and the histological picture was found to be typical of Hodgkin's disease. A course of radio therapy was given with no recurrence in the next two years. In the mean time he developed a lesion in the thoracic spine resembling Pott's disease but a punch biopsy of the vertebral bodies showed Hodgkin's disease of the spine. This confusing picture is still not finally clarified.

Bacteriology.—In recent years we have not attempted to distinguish between the bovine and the human bacillus. In 1916 in New York 30% of cases in children were due to the bovine bacillus.³ As late as 1932, 64% cases in children under 13 in Glasgow were bovine.¹⁶ In this Province the bovine bacillus has been almost eliminated and we assume our cases are now all, or almost all human in type. Two of our cases, however, were negative to human O.T. but positive to avian O.T. The avian bacillus does not cause pulmonary, bone and joint or G.U. tuberculosis in the human but has been known to infect lymph nodes on rare occasions.

TREATMENT

An outline of the historical aspects of the treatment of this disease was given at the begin-

ning of this paper. The use of streptomycin and PAS and more recently of isoniazid have again altered the picture. It is important first to have a clear idea of the natural history of the disease untreated, in order to evaluate the effectiveness of any particular line of treatment. For this disease, though chronic and protracted, has a natural tendency to spontaneous cure. A fair proportion of cases in which the resistance is high will resolve and the nodes become impalpable without caseation or sinus formation ever occurring. And even if the nodes break down, they will eventually heal when the remains of the caseous nodes have been discharged, though this may take many years and leave ugly scars. We have to be sure that our treatments do not make the patient worse. We have for instance a woman who was given x-ray

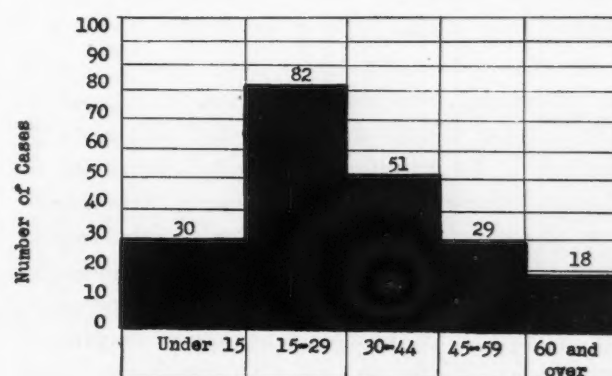


Chart 2.—Age incidence.

treatment at another hospital. The neck is stiff with induration from the fibrous tissue reaction and she has a most disfiguring telangiectasis of the skin. There have been cases of epithelioma of the skin following irradiation of tuberculous nodes. Block dissections also are not justified nowadays with their deformity and attendant risk to important structures such as the accessory nerve.

Our present position as regards treatment may be summarized as follows. We regard tuberculosis of the lymph nodes in the same category as tuberculosis elsewhere in the body and consider that a period of sanatorium care is the best guarantee of future health. Upon admission our patients are placed on an initial six months' course of streptomycin 1.0 gm. twice a week and PAS 10.0 gm. daily. Early experience with streptomycin was confusing. Some cases responded dramatically and permanently. With others there was little response and fresh nodes or abscesses appeared while still under treatment or when

treatment stopped, though sinuses were usually benefited.¹⁷ There is no doubt, however, that in the early days of streptomycin the courses were far too short to have a maximum effect, and without PAS resistance developed rapidly. The picture has been entirely altered with the present regimen of a long course of intermittent streptomycin with daily PAS. Exacerbations of the disease may occur as long as four months after the course has begun but if it is continued, final healing may result. It is hardly surprising if short courses of streptomycin given outside sanatoria prove disappointing. The early proliferative or exudative phase in the nodes is clearly the most likely to do well. Cold abscesses are aspirated as required and on each occasion 0.5 gm. streptomycin is left in the abscess. Discharging sinuses are occluded with Keith's dressing and secondary invaders are dealt with by the appropriate sulfonamide or antibiotic.

In this series, 38 cases were treated with streptomycin. Seventeen of these cases (45%) had a good result—sinuses healed or remained healed, nodes rapidly or steadily decreased in size and there were no recurrences after cessation of treatment. Nine cases had a fair result—there was some reduction in the size of the nodes or in the discharge from the sinuses. Eleven cases had a poor result, either no change or continued progression while receiving streptomycin. Two cases died. The disappointing results were nearly all during the early years of streptomycin treatment, when short courses were given with or without PAS. Of these 38 cases receiving streptomycin, 21 received it as their definitive treatment and the remaining 17 cases received it in conjunction with operative treatment.

As soon as the disease is quiescent—usually after six months' treatment, then the case is reviewed to see whether surgery is indicated while still under streptomycin and PAS coverage.

Indications for operation at this stage are: (1) An unhealed sinus. (2) A residual mass of lymph nodes.

Contraindications to operation are: (1) The disease still too active or the periadenitis too extensive. (2) The presence of serious active pulmonary tuberculosis. (3) The presence of active tuberculosis of the middle ear or mastoid. (4) Children under two years of age. (5) A generalized node involvement. (6) The small fibrous type in adults.

Operation should remove caseous nodes, sinus

tracks and walls of abscesses, but small soft nodes may be left. All sinuses must be explored to their source under the deep fascia. Two short incisions along Langer's lines are better than one long vertical one. Excision of all nodes should not be attempted but just the *main residual mass*. The danger to important structures is too great to warrant radical block dissections. Dead space should be obliterated and the wound closed without drainage if possible. Enlarged tonsils and adenoids should be removed also, especially in children. A further three months' course of streptomycin and PAS may be given following the operation and by that time the patient should be ready for discharge from the sanatorium. Isoniazid has been in use too short a period to be able to judge whether it will add anything to the treatment of the disease.

Other forms of treatment are not used much in this sanatorium at present. Most of the early cases had ultraviolet light with some benefit perhaps but nothing very spectacular. Eight cases had irradiation of cervical nodes prior to admission. One was definitely improved. One has been left with induration of the neck and a very disfiguring telangiectasis. Irradiation is not directly bacteriocidal and cannot deal with caseation or abscess formation, but simply induces fibrosis. Calciferol is used by some workers as a preparation for operation.¹⁸ Nitrogen Mustard has been tried in a small series with apparent benefit.¹⁹ Some institutions use tuberculin but we have not used it here for some years as it seems to us that other methods of treatment are safer and better. One patient in this series received injections of the Vole bacillus but died of hæmorrhage from tuberculous ulcers in the intestine without recession of the adenitis. Another patient received gold injections without marked benefit. Streptokinase and streptodornase may be used for the debridement of sinus tracks in patients too sick for more radical measures.⁷

Complications.—These have been few. Out of 58 patients with tuberculosis of the superficial lymph nodes operated upon, four received damage to the accessory nerve. One of these was temporary and recovered. Two were unilateral and permanent and the fourth was bilateral and permanent. Two had temporary damage to the mandibular division of the facial nerve and one had temporary damage to the hypoglossal nerve.

Prognosis.—We have not attempted any large scale follow-up but from other series reported

in the literature^{4, 20} only 1 to 2% those adequately treated may expect recurrence of the involved nodes following their discharge from sanatorium.

SUMMARY AND CONCLUSIONS

This paper is an analysis of 210 cases of tuberculosis of the superficial lymph nodes discharged from this sanatorium over a 20 year period.

Although the mortality from tuberculosis is steadily falling, we are seeing more cases of this form of the disease. It is however an uncommon form of tuberculosis. As infection with the bovine bacillus through tuberculous milk has now been virtually eliminated from this Province, tuberculosis of the lymph nodes is no longer predominantly a disease of childhood but its maximum

Long term intermittent streptomycin with daily PAS gives the best results. When the disease has become stationary or quiescent, then any residual mass or sinus may be excised by a local resection. Isoniazid has not been in use sufficiently long to be able to evaluate its effect.

Twenty-three per cent of this series died of some form of tuberculosis while in the sanatorium, the majority before streptomycin became available. The mortality under present régimes is much lower. Only 1 to 2% cases will recur following adequate treatment.

I wish to express my indebtedness to Dr. C. A. Wicks, Superintendent of the Toronto Hospital for Tuberculosis, Weston, Ontario, Dr. R. I. Harris and Dr. F. G. Kergin, consulting Surgeons and Dr. H. S. Coulthard, Chief of the Surgical Service.

TABLE V.

Treatment received	CONDITION ON DISCHARGE					Total	Percentage
	Sanatorium care only	Aspiration or drainage	Early excision including biopsy	Late excision	Streptomycin alone		
Results							
Sinuses healed, nodes impalpable.	26	25	17	12	12	92	44%
Sinuses healed, quiescent nodes...	23	16	12	9	8	68	32%
Sinuses open, active nodes.....	0	0	2	0	0	2	1%
Died.....	27	14	1	5	1	48	23%
Total.....	76	55	32	26	21	210	100%

NOTE:

1. Twenty one cases received streptomycin as their definitive treatment. A further 17 cases received it in conjunction with early or late excision.
2. A large number of uncomplicated cases had good results on simple sanatorium care even before the days of streptomycin.
3. Of the 48 cases who died, only one could be said to have succumbed to the lymph node tuberculosis (Case

2 above). The cause of death in the remainder was as follows:

Pulmonary or G.U. tuberculosis	31
Miliary tuberculosis and meningitis	10
Tuberculous pericarditis	2
Tuberculous enteritis (one from hæmorrhage)	2
Hæmatemesis due to ulceration of a tuberculous node into the esophagus	1
Not stated	1

incidence follows the incidence of tuberculosis in general.

Eighty-eight per cent of the cases had associated tuberculosis in other parts of the body, most commonly in the lungs, and bones and joints and this greatly affected the end results of treatment. North American Indians and Eskimaux showed the usual low resistance to the disease.

A generalized involvement of the lymph nodes indicates a low resistance in the lymphatic system and carries a high mortality.

The diagnosis may be very difficult histologically, and bacteriological proof is the only certain proof.

REFERENCES

1. MAJOR, R. H.: *Classic Descriptions of Disease*, Charles C. Thomas, Springfield, Ill., 1945.
2. ALBUTT, T. C. AND TEALE, T. P.: *Clinical Lectures*, London, 1885.
3. DOWD, C. N.: *J. A. M. A.*, 67: 499, 1916.
4. BAILEY, H.: *Brit. J. Surg.*, 33: 53, 1945-6.
5. BAILEY, H.: *Lancet*, 1: 313, 1948.
6. LESTER, C. W.: *Surg., Gynec. & Obst.*, 87: 719, 1948.
7. LESTER, C. W.: *Am. Rev. Tuberc.*, 64: 691, 1951.
8. MCCLEINTOCK, H. T.: Director, Gage Institute Chest Clinic, Toronto, Ontario. Personal communication, 1952.
9. JONES, B. S.: *Brit. M. J.*, 1: 1056, 1951.
10. BOYD, W.: *Surgical Pathology*, Saunders, Philadelphia, 1951.
11. Annotation: *Brit. M. J.*, 1: 1069, 1951.
12. BURKE, H. E.: *Am. Rev. Tuberc.*, 62: 48, 1950.
13. ARDEN, G. P. AND SCOTT, J. C.: *Brit. M. J.*, 2: 87, 1947.
14. BAILEY, H.: *Tubercle*, 29: 174, 1948.
15. McDONALD, J. R. AND WEED, L. A.: *Am. J. Clin. Path.*, 21: 223, 1951.
16. GRIFFITH, A. S.: *Edinburgh M. J.*, 39: 177, 1932.
17. Report of the council on pharmacy and chemistry on effects of streptomycin on tuberculosis in man: *J. A. M. A.*, 135: 634, 1947.
18. GAUVAIN, S.: *Tubercle*, 29: 259, 1948.
19. DOTTO, M. D. AND SCARDIGLI, G.: *Settimana Medica*, 39: 158, 1951; and *J. A. M. A.*, 146: 1617, 1951.
20. REID, R.: *Post-Grad. M. J.*, 25: 465, 1949.

TREATMENT OF TRUE
WIDENING OF ANKLE
MORTISEPATRICK G. COSTIGAN, B.A., M.D.,
Banff, Alta.

THE FOLLOWING ARTICLE will deal mainly with true widening of ankle mortise, associated with simple short oblique fractures of the inferior end of the fibula, and the rupture of the inferior tibio-fibular ligaments, usually both the anterior and posterior ligaments.

This type of injury is commonly seen amongst people participating in athletics and is extremely common in the ski circles, where the fracture of the fibula is a torsion, or twisting fracture and the inferior tibio-fibular ligaments are completely torn or avulsed by this twisting force. Invariably there is a great deal of oedema of the soft tissues in the region of the injury; and also a lot of hæmatoma in and around the mortise. It is not common to see discoloration of the skin three or four days after the injury extending almost to the knee on the affected leg.

It has been our experience in dealing with a great number of these injuries that it is a waste of time to reduce the diastasis before the swelling has gone down. The reduction in itself is quite simple, and easily accomplished, however, as the swelling goes down the plaster becomes quite loose, and the widening re-occurs. We have attempted to reduce this swelling by massaging the oedema to above the malleoli, and then applying an Esmarck bandage starting at the toes and extending to well above the malleoli. Following these procedures, the diastasis is then reduced; however, invariably the widening has re-occurred in from five to nine days.

True widening of the ankle mortise may occur (1) in association with fractures of the lateral malleolus and tearing of the inferior tibio-fibular ligaments and interosseous ligament. (2) In association with a fracture of the medial malleolus at or near its base. (3) In tri-malleolar fractures, where the above conditions are present on either the lateral or medial side of the mortise, or on both sides. (4) It may occur where there is a tearing of the inferior tibio-fibular ligaments, both anterior and posterior and interosseous ligament, without any fracture in the region of the ankle mortise.

The diastasis that occurs in type (1) is very easily reduced; but quite difficult to maintain by closed methods.

The diastasis that occurs in type (2) is quite readily reduced and maintained by closed methods in well over 50% of the cases, providing that there is not a large piece of tissue between the fragments, which is the exception rather than the rule.

The diastasis that occurs in type (3) is quite readily reduced by closed methods, but requires x-rays examination and may have to be reduced two or three times in the first twenty-one days before it can be maintained.

The diastasis that occurs in type (4) is readily reducible, but difficult to maintain by closed methods. We have seen two cases here in six years, where there was a posterior dislocation of the talus with rupture of inferior tibio-fibular ligaments and true widening of the ankle mortise without a fracture.

In dealing with fractures of the medial malleolus, and the posterior lip of the tibia, certain rules are generally accepted with respect to performing open reductions. One of the rules is, that the main reason for surgical intervention in a fracture involving the medial malleolus, is that there is soft tissue interposed between the fragments. The surgeon who has opened any number of these fractures knows that it is the exception rather than the rule to find any significant amount of soft tissue between the fragments, and that rarely one will be convinced that the amount of soft tissue he has removed would have prevented bony union, or a solid fibrous union.

In dealing with fractures of the posterior lip, it is generally accepted that if the fragment involves more than one-third of the articular surface, an open reduction with internal fixation is indicated. This is not so; and often larger fragments than this can be manipulated into good position, and held with the foot in thirty to forty-five degrees of plantar flexion, and then brought to a right angle at the end of two weeks.

Several methods have been devised for judging whether or not there is a diastasis of the ankle joint. One of the most common is to x-ray both ankles, and compare the A.P. views. We have found that unless the diastasis is readily visualized, it is of little significance. A partial tear of the inferior ligaments may give very slight, but not too evident diastasis, if a fracture is present

the ligament will heal sufficiently well to prevent further widening; during the time required to heal the fracture in plaster. If there is no fracture present, the sprain should be treated similarly to any other sprain, *i.e.* immobilization in a short cast for fifteen to twenty-one days or strapping with adhesive and partial or non-weight bearing on crutches.

METHOD OF CLOSED REDUCTION

Closed reduction of diastasis of the ankle mortise is a very simple procedure, not requiring a Bohler reducer, or any other form of mechanical device. Spinal anaesthesia is the anaesthetic of choice, and we usually use a unilateral spinal, given by placing patient on affected side, and maintaining him in this position for a few minutes after the spinal has been given. The patient is then turned on his back and the affected leg is allowed to hang over the end of the table. Cotton wadding is wrapped around the lower leg, going around the malleolar area two or three times. Eight 4-inch strips or slabs of plaster are then dipped in warm water, and placed in stirrup fashion down one side of the lower leg; under the heel and up the other side of the leg. A 6-inch roll is then rolled over the plaster stirrup, again going around the malleolar area two or three times. The foot is then brought up to a right angle with the lower leg, and maintained in this position by supporting it on the operator's knee. The fingers of both hands are then gripped over the Achilles tendon, which allows the thenar eminences to fall on the malleoli. The maximum pressure or compression that one can exert, and maintain on the malleoli, is then utilized to reduce the diastasis. This pressure must be maintained until the plaster has set, and moulded itself into the contour of the bony prominences of the ankle joint. This will take from seven to ten minutes with cellona or gypsona plaster. Then three or four more 6-inch plaster bandages are rolled over the lower leg; and as a rule a full length plaster of Paris cast is applied.

This method of reduction has been used successfully in two cases of diastasis of the ankle joint; one of which had gone untreated for 19 days following the injury; and one that had gone 17 days following the injury. If the above procedure of reduction is followed carefully, the true widening may be reduced in all cases, un-

less there is an intra-articular fragment blocking the reduction.

We have never had a skin slough from pressure over the malleoli, although invariably the ankle is very painful immediately after the reduction and may require elevation and sedation with Demerol for from eight to twelve hours.

We have never seen a true widening over reduced by closed methods. It may be possible to do this providing that the foot is not at right angles at the time of the reduction, hence throwing the narrowest diameter of the talus into the mortise, and allowing one to over reduce the diastasis. If it is possible for this to occur, then one should assume that ligamentous stretch later on with weight bearing, pushing the foot to a right angle, would correct the over reduction. We have seen three cases of over reduction with internal fixation by means of a Clay Ray Murray plate complaining of severe pain when the body weight was on the affected side. When the plate was removed, the pain disappeared. Probably these plates were applied with the foot in slight plantar flexion, and the narrow diameter of the talus in the mortise.

AN EFFECTIVE AND SIMPLE METHOD OF OPEN REDUCTION WITH INTERNAL FIXATION

We have found that the safest and quickest method of reducing and maintaining a true diastasis, associated with a fracture of the inferior end of the fibula in young people, is by open reduction and internal fixation with an inch and three-quarter stainless steel screw.

An incision is made slightly posteriorly to the posterior margin of the lateral malleolus and along the posterior border of the fibula. The skin and subcutaneous tissue are dissected from the malleolus, the periosteum is elevated from an area not any larger than the head of the screw. A drill hole is then made with a 9/64 bit, drilling upward and anteriorly through both cortices of the fibula and entering the tibia just above its articular surfaces. A 3/32 Kirschner wire is then inserted through the drill hole and into the medullary canal of the tibia. An A.P. film is then taken to be sure that the wire is not passing through the articular portion of mortise. Providing that the drill hole is in proper position, and that the lower end of the fibula is not being pried laterally increasing the widening, an inch and three-quarter screw is screwed through the fibula; watching again that this does not cause

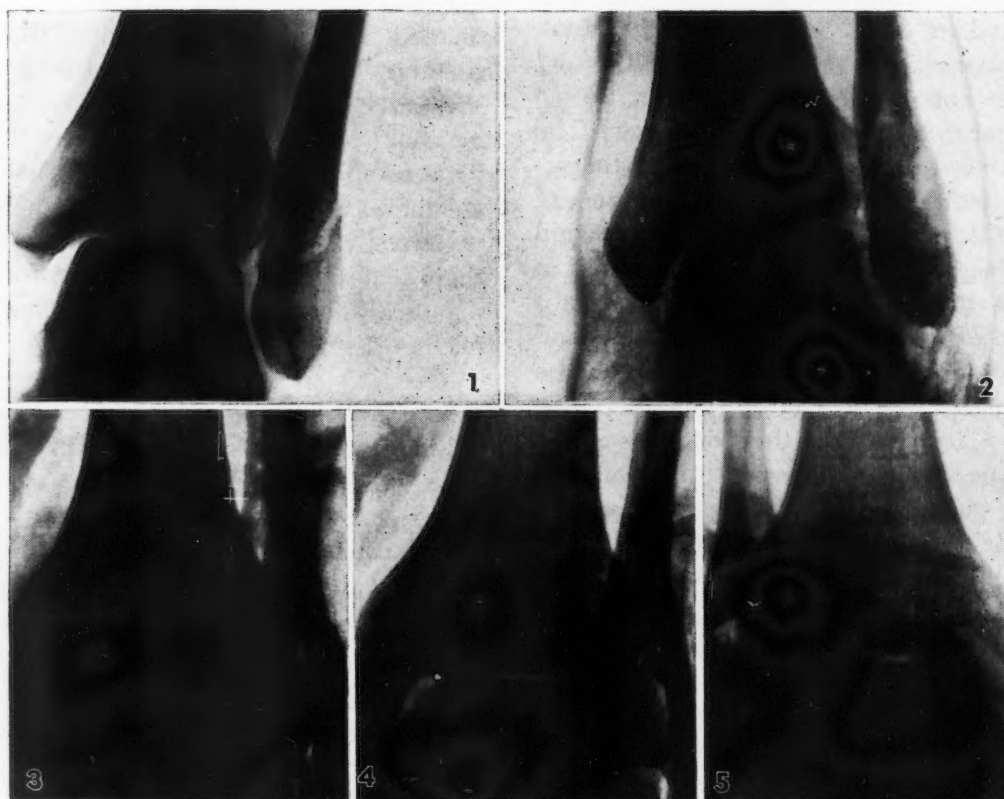
lower end of the fibula to move laterally. The screw is then driven into the tibia running superiorly and toward the anterior cortex.

Recently it has been advocated by some groups, that a short screw be used to fix the fibular fragments; before the lower screw is inserted, and that this shortens the healing time. We feel that this is not necessary since we immobilize for at least ten weeks without a caliper, and have never seen a non-union in an oblique fracture of the fibula in this area. During this procedure the foot is maintained at right angles at all times. As a rule a full length plaster of

physal plate at the level of the superior margin of the talus.

CASE 1

A male, aged 24, who obtained a fracture of the lateral malleolus with a minimum amount of widening of the ankle mortise. This leg was immobilized in a non-weight bearing short plaster cast for a period of three weeks, at which time a walking iron was applied. No attempt was made to reduce this widening. At the end of five weeks the cast was removed and weight bearing commenced. I saw this man one year later on the ski hill with no disability and complete range of motion without pain or swelling even after a full day of skiing. Fig. 1. The original film. Fig. 2. In a plaster cast with no attempt to reduce the widening.



Paris cast is applied for at least three to four weeks. A short non-weight bearing cast is then applied for a further six to eight weeks. Many surgeons apply a walking caliper at the end of one month. It seems that the only type of complication that one could have in this type of an injury would be from axial pressure driving the talus up into the mortise, and causing a recurrence of the diastasis. One would think that a good way to obtain this would be to apply a walking boot or caliper.

We have seen four cases of non-union of the fibula where the fracture is a transverse fracture of the fibula, through the area of the old epi-

CASE 2

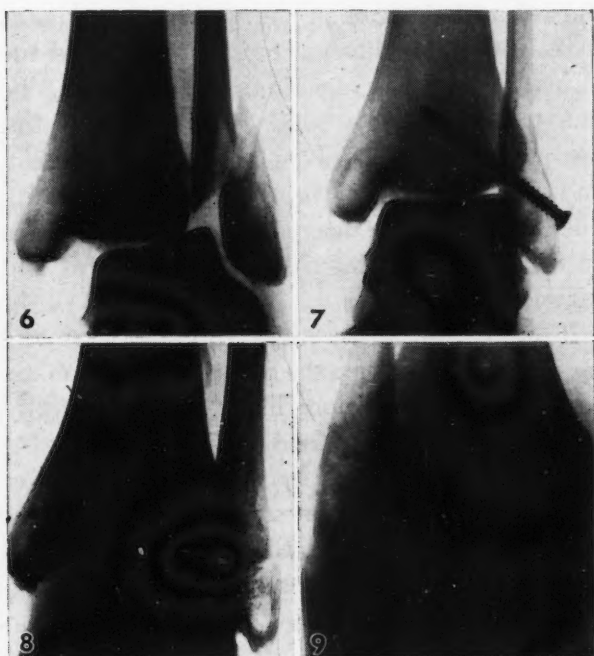
A male, aged 21, who sustained a fracture of the lateral malleolus and a fracture of the posterior malleolus with a true widening of the ankle mortise, while skiing December 1, 1951. He was admitted to hospital and the ankle was compressed and elevated for a period of four days. On December 5, under spinal anaesthesia, an Esmarch bandage was applied in order to reduce the swelling. The widening was then reduced by closed reduction in the manner described above. Fig. 3 shows the post reduction films with the true widening having been reduced. Fig. 4 taken on December 12, shows that the widening has recurred in the plaster cast. Fig. 5 taken on December 19 shows the widening has re-occurred. At this time we decided to keep his ankle immobilized for a further six weeks and then to start weight bearing.

I saw this boy five months from the date of the original accident. He now has a markedly swollen ankle with a considerable amount of pain after he has been

standing on it for a short time. It is my plan now to operate and reduce the widening with internal fixation, and probably plastic repair.

CASE 3

A female, aged 35, sustained a fracture of the lateral malleolus with true widening of the ankle mortise on January 3, 1952. An open reduction was performed on January 6, 1952. The widening was reduced and held with a 1¼ inch screw. A full length plaster of Paris cast was applied for a period of one month, at which time the plaster was removed and a short non-weight bearing cast was applied for a further period of seven weeks. The cast was then removed and she was started on physiotherapy and allowed to bear weight. She now has full range of movement and is pain-free with no swelling, after being on her feet for long periods of time. Fig. 6. Original film. Fig. 7. The postoperative film.



CASE 4

A male, aged 19, who sustained a fracture of the lateral malleolus on December 14, 1946. On December 20 the swelling had gone down, the widening was reduced under spinal anaesthesia and a full length plaster of Paris cast was applied. Fig. 8 shows the original injury. Fig. 9 is a post-reduction film.

On January 7, 1947, this ankle was again x-rayed and the widening had re-occurred. At this time open reduction with internal fixation was carried out. This boy obtained an excellent ankle with no disability following surgery.

CASE 5

A female, aged 26, sustained a fracture of the lateral malleolus on April 15, 1951, with a true widening of the ankle mortise. On April 25, ten days after the injury, an open reduction with internal fixation was performed. This young lady went back to her position as a ski instructress and first aid assistant on the ski hill in Banff, the following year. Figs. 10 and 11 show x-rays taken with the internal fixation in place, one year following her accident. She has full range of movement with no disability.

SUMMARY

1. True widening or diastasis of the ankle mortise associated with a fracture of the inferior end of the fibula is commonly seen in torsion fractures at this level.

2. We have found that in dealing with young active people, open reduction and internal fixation with one screw is the surest and quickest method of obtaining a stable, non-painful weight bearing ankle joint.

3. This one screw method has been used in over twenty-five cases during the period of five

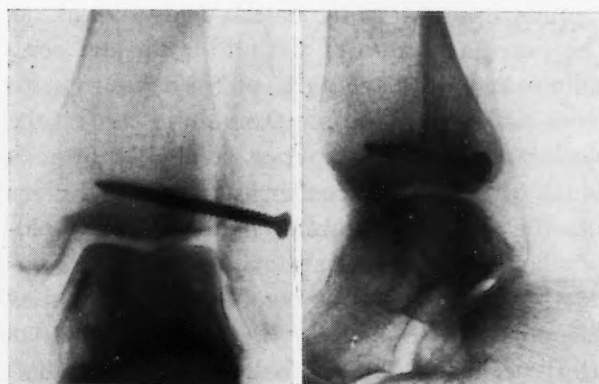


Fig. 10

Fig. 11

years, and in not one case have we found it necessary to remove the screw at a later date, because of pain, even though the greater number of these people have returned to the ski slopes.

"At mid-century, as one scans 50 years of medical progress, it is the phenomenal growth of the natural sciences that stands out clearly as the driving force responsible for the extraordinary advances that have been made in medicine. It has led to an enormous increase in man's understanding of his physical constitution and to effective measures for treating a host of diseases that beset it. This is common knowledge. We tend to see less clearly, at least we tend to forget, how the phenomenal growth of science has complicated the teaching of medicine, yet the medical curriculum has not evolved to meet these changes. On the contrary, the curriculum continues to adhere to a pattern that was designed in different times and under different circumstances."—George Packer Berry, *J. Med. Education*, 28: 17, 1953.

Case Reports

BASILAR ARTERY SYNDROME*

MURRAY H. CAMPBELL, M.D.,† *Winnipeg*

THE BASILAR ARTERY which is probably more frequently affected by arteriosclerosis than any other artery in the body,¹ is prone to thrombosis, and because of the sharp angle at which it divides into the posterior cerebrals, to embolism as well. Occlusion of the basilar artery with disturbance of function in the areas of the brain it supplies is known as the basilar artery syndrome. The pons, a portion of the mid-brain and cerebellum and adjacent parts of the cerebrum receive their blood supply from branches of the basilar artery. The superior cerebellar arteries which branch off the basilar just before it divides into the posterior cerebrals nourish the cerebellum but since a good alternative supply is provided via the posterior communicating arteries this organ often escapes the effects of basilar artery occlusion. The cerebellum is also supplied from the vertebral arteries through the posterior inferior cerebellar arteries. The mid-brain and neighbouring cerebrum (portions of the temporal lobe, the occipital lobe, particularly the visual cortex and posterior thalamus) are supplied by the posterior cerebrals and again should only be involved if the occlusion is gross at the point where the basilar artery divides.

A detailed summary of the portions of the brain supplied by the basilar artery and its branches is given by Meadows¹ and it is apparent from this and other articles reviewed that the circulation of the pons is subject to great variations. It seems reasonable to conclude that this organ unlike the other portions of the brain supplied by the basilar artery does not usually have an adequate collateral circulation.

Varying degrees of dizziness often of increasing severity may precede the other symptoms. Headache and vomiting are usually complained of next with a crossed hemiparesis or hemiplegia and/or a loss of consciousness. Dysarthria, dysphagia, blurring of vision, paresthesias and emotional disturbances form part of the syndrome.

All symptoms and sensory disturbances may alternate from one side to the other.

Dysphagia, dysarthria and emotional disturbances are probably due to involvement of the cortico-spinal tract. The dysphagia may also indicate a direct disturbance of the ninth and tenth nuclei, and dysarthria, involvement of the twelfth nucleus. The hemiplegia is associated with loss of function of the pyramidal tract, the facial paralysis to the interference with the seventh nucleus or the pontine portion of the seventh nerve and the visual disturbance to the damage of the third and/or sixth nuclei. The dizziness may be a result of imbalance of the function of the lateral lemniscus or the vestibular nuclei or if the internal auditory artery is a branch of the basilar artery, as is sometimes the case, it will be due to imbalance of the vestibular apparatus. Symptoms due to involvement of the cerebellum and neighbouring parts of the cerebrum supplied by the basilar artery are fully considered in an exhaustive analysis of 18 cases by Kubik and Adams.⁶

If embolism rather than thrombosis is the cause of this syndrome the onset is more dramatic and early death is more likely. In the majority of cases death takes place in from two days to five weeks⁶ and complete recovery has not yet been recorded. The differential diagnosis includes cerebral hæmorrhage in the brain stem, hypertensive encephalopathy and acute disseminated sclerosis in younger people.

The patient, a butcher, aged 74, was seen August 25, 1952 with nausea and vomiting of one hour's duration and relatively sudden onset. He had no other complaints, he had been previously well and no cause for his symptoms could be ascertained. The examination was non-contributory and the next day he had completely recovered. He was advised to report to the office and did so on August 31; at that time he had a hypertension of 195/90 (later readings varied from 210/90 to 165/85), moderate arteriosclerosis of the medium arteries and grade I to II arteriosclerosis of the retinal vessels. Urinalysis was normal. Examination of the heart revealed only an accentuated aortic second sound and electrocardiograms taken at later dates showed non-specific myocardial damage.

While sitting at lunch on September 7 the patient suddenly found that he could not speak or move his right arm or leg. When seen fifteen minutes later he had a hemiplegia on the right side with a Babinski sign, and facial paralysis of the upper motor neurone type on the left side of his face. Attempts at speech resulted in guttural sounds—later he reported he had difficulty in swallowing food present in his mouth at the onset of the attack. He was immediately admitted to hospital and on examination seventy-five minutes from the time of the onset of the paralysis, he was found to have completely recovered. It was learned that he had had weakness of the left arm for a few minutes the day before and intermittent blurring of vision and dizziness for several days.

*From the Department of Medicine, General Hospital, Winnipeg.

†Lecturer in Medicine, University of Manitoba.

The differential diagnoses included hæmorrhage or thrombosis in the brain stem area, hypertensive encephalopathy and cerebral embolism. Because of the transient nature of the paralysis, hæmorrhage was considered to be unlikely, and since the signs and symptoms localized the lesion to the brain stem and the blood pressure was not markedly elevated, encephalopathy was not probable. In practically all cases of embolism proved at autopsy in an exhaustive analysis of the basilar artery syndrome by Kubik and Adams⁶ the initial or dominating feature was loss of consciousness and the other symptoms were also severe. Nor in the case being presented was there any obvious source for an embolus. The diagnosis, therefore, was cerebral thrombosis and the combination of crossed paralysis, dysphagia and dysarthria, the antecedent dizziness and visual disturbances placed the site of the lesion in the pons and the thrombosis in the middle portion basilar artery or in the branches supplying the pons.

For reasons to be discussed below the patient was placed on an anticoagulant for two weeks and discharged September 28, having had no recurrence. At 5 a.m. October 12, the patient got up to urinate and one hour later he had a recurrence of paralysis in the same sites as before. Examination twenty minutes after the onset disclosed the same findings as on the previous occasion. There was no evidence, either subjective or objective to suggest interference with the third or sixth nerves and no sensory signs or symptoms. Within a few minutes the patient was able to move the fingers on the affected side and make himself understood and before an hour had elapsed he was normal in all respects.

Three days later he had three lesser attacks in a space of three hours, characterized by hemiparesis rather than hemiplegia and garbled but intelligible speech. Because of the serious prognosis⁶ the patient was readmitted to hospital and replaced on Danilone. During the next two weeks he had no further attacks, the prothrombin time became stabilized at between 25 and 30% of normal, and he was discharged on this routine. It was realized that this treatment carried a threat of cerebral hæmorrhage but it was felt that without treatment the risk of recurrence with severe permanent paralysis or a fatal outcome presented a greater danger. The relatives were made cognizant of the possibilities and treatment is being carried out with their consent. The prothrombin time is tested every three weeks and is fairly constant at 30% of normal on 37½ mgm. of Danilone daily. Five months have elapsed since this routine was begun, there have been no further attacks and the patient has recently returned to part-time work.

SUMMARY

Basilar artery syndrome has been briefly discussed, and a patient exhibiting this condition has been presented. It is suggested that the cause in this case was thrombosis and this is substantiated to some extent by the absence of attacks in the five month period during which he has been receiving anticoagulants.

PROGRESS NOTE

A further three months has elapsed and the patient has had no recurrence of paralyzes or pareses.

The helpful criticisms of Prof. I. McLaren Thompson, Professor of Anatomy, University of Manitoba and Dr. R. T. Ross are gratefully acknowledged.

REFERENCES

1. MEADOWS, S. P.: Basilar Artery Syndrome, The (British) Medical Annual, p. 65, 1952.
2. STRONG, O. AND ELWYN, A.: Human Neuroanatomy, Williams and Watkins, Baltimore, p. 244, 1948.
3. ATKINSON, W. J.: *J. Neurol., Neurosurg. & Psychiat.*, 12: 137, 1949.
4. FOIX, C. AND HILLEMANT, P.: *Rev. de Méd.*, 43: 287, 1926.
5. PINES, L. AND GILINSKY, E.: *Arch. f. Psychiat.*, 97: 380, 1932.
6. KUBIK, C. AND ADAMS, R. D.: *Brain*, 59: 73, 1946.

THREE ATYPICAL CASES OF HODGKIN'S DISEASE, PRESENTING WITH LIVER FAILURE

W. H. D. FAIRBANK, B.M., B.Ch.,
New Westminster, B.C.

DURING 1952 three patients were admitted to Royal Columbian Hospital, New Westminster, B.C. with an acute febrile illness, hepatomegaly, jaundice and liver failure. The disease ran a rapidly fatal course and diagnosis was made only at autopsy when the condition was shown to be due to Hodgkin's disease, although lymph nodes had never been palpable clinically.

CASE 1

The patient was a married East Indian woman of 33 years. Six weeks before death she began to notice shortness of breath on exertion, extreme weakness, anorexia, nausea and vomiting, with some vague upper abdominal pain and periodic fever.

On admission, three weeks later, the temperature was 100.6°, the pulse 120 and the respirations 18. The blood pressure was 110/70. There were no palpable lymph nodes anywhere; some moist râles were found over both lungs; there was some distension of the abdomen; the liver was palpable 15 cm. below the costal margin and the spleen 13 cm., but there was no tenderness and no signs of ascites. Examination of the rectum, vagina and central nervous system revealed nothing abnormal.

Investigation on admission: x-ray chest and abdomen and barium meal—negative. R.B.C. 3,800,000; Hb. 9.6 gm.; red cell sed. rate 56 mm. per hour. Four blood transfusions made very little difference to this. W.B.C. 4,000. Monocytes 16%, differential otherwise normal. Sternal marrow smears showed no abnormality other than a similar increase in the monocytes.

Total serum bilirubin 2.2 mgm. %. Serum protein 6.4 gm. %. Serum albumin 3.3 gm. %. Serum globulin 3.1 gm. %. Prothrombin time 20 seconds (Normal up to 15 seconds). Thymol turbidity 8.4 Maclagan units (normal up to 4 units). Bromsulphalein excretion test 44% retention in 30 min. (normal up to 10% retention). Alkaline phosphatase 58 King units (normal up to 13 units) N.P.N. 28 mgm. %.

Urinary urobilinogen 0.34 Ehrlich units per 2 hour specimen. Widal test—negative. Kahn test—negative.

The patient ran a continuous spiking fever during her stay in hospital, averaging about 104°. Her symptoms continued and she gradually deteriorated. About a week before death she became very distended and jaundiced and this became progressively worse until she died.

At autopsy the cardiovascular system showed no abnormality apart from jaundice. There was about 300 c.c. of clear jaundiced fluid in each pleural sac and a small amount of similar ascitic fluid.

The liver weighed 3,975 gm. Its surface was smooth and in section appeared a slightly mottled reddish brown. The organ was firm, but friable. The gallbladder was healthy and the bile ducts patent. There were mucosal petechiae in the stomach and duodenum and there was a little altered blood in these organs. The remainder of the small bowel and the large intestine were normal. The spleen weighed 1,500 gm. It was reddish-purple, moderately firm and very friable. The other organs were normal apart from jaundice. There were no enlarged lymph nodes in the mediastinum or abdomen.

On microscopic examination the liver and spleen showed marked infiltration by groups of cells in which giant cells of the Dorothy Reed type occurred. This infiltration was generalized and diffuse throughout both portal tracts and sinusoids in the liver, and the appearances were those of Hodgkin's sarcoma.

CASE 2

This was a white man of 77 years. Eight and one-half weeks before death he had a sudden attack of pain in the left lower quadrant of his abdomen. On examination, acute diverticulitis was diagnosed and in response to treatment the pain subsided in a few days but was replaced by mild epigastric pains. There was no nausea but his appetite remained poor and he became quite weak.

On admission, two weeks later, he had a temperature of 101°, pulse 72 and respirations 20. He was slightly dyspnoeic on exertion and had slight scleral icterus. There was no adenopathy; his lungs were somewhat emphysematous but otherwise clear; his heart was apparently normal; his blood pressure 115/60. The abdomen was slightly distended, soft and rather tender in the right upper quadrant. A tongue of liver projected two fingers' breadth below the costal margin; it was firm and slightly tender. Examination of the rectum and central nervous system revealed nothing abnormal.

Investigations were as follows: Chest x-ray negative. Barium meal, hiatus hernia of stomach. Barium enema. diverticulitis; no tumour seen. Spine x-ray, severe osteoarthritis. Sigmoidoscopy to ten inches, negative.

R.B.C. 3,720,000; Hb. 9.5 gm. Red cell sed. rate 16 mm. per hour. Three blood transfusions caused very little change. W.B.C. 7,200; differential normal. Serum bilirubin 2.4 mgm. %. Urinary urobilinogen 1.25 Ehrlich units per 2 hour specimen. Stools showed occult blood and 350 Ehrlich units of urobilinogen per 100 grams of faeces. Serum protein 4.7 gm. %; albumin 3.3; globulin 1.4. Prothrombin time 21 secs. Thymol turbidity 1.9 Maclagan units. Alkaline phosphatase 38 King units. N.P.N. 38 mgm. %.

The temperature was of the Pel-Ebstein type, ranging from 99 to 102°. He developed thrush in his mouth and a cough with expectoration of clear mucoid sputum. He gradually became weaker and lost all appetite, the extremities became oedematous and he lost a good deal of weight before he died. Serum bilirubin repeated 10 days before death showed a total of 3.6 mgm. %; direct reaction 2 mgm. %; indirect 1.6 mgm. %.

At post mortem the cardiovascular system was normal. Both lungs and the bronchial mucous membranes were congested but no pneumonia was evident. The upper mediastinal lymph nodes were somewhat enlarged by gray tumour. Bloody ascitic fluid was found in the peritoneal cavity. The mesenteric lymph nodes were enlarged and gray and some were necrotic. The gastrointestinal tract contained altered blood and there were superficial ulcers along the greater part of the oesophagus. There was a small polyp 15 cm. above the rectum.

The liver was slightly granular and enlarged to weigh 2,500 gm. On section it was diffusely involved by tiny white pinhead areas. The gallbladder appeared normal. The spleen weighed 1,840 gm.; it contained numerous old and recent infarcts and was surrounded by adhesions. The genito-urinary system was normal except for petechial haemorrhages in the kidneys.

On microscopic section, the liver, spleen and lymph nodes revealed typical Hodgkin's sarcoma. The infiltra-

tion of the liver was confined to the portal tracts. The sigmoid polyp revealed mucoid carcinoma.

CASE 3

This was a white man of 52 years. Six weeks before death he first presented himself complaining of weakness, sweating, chilly sensations and vague abdominal discomfort. At that time there was slight icterus, but he was not acutely ill.

On admission, two weeks later, he was extremely weak. He was eating and drinking very little and had lost much weight. His temperature was 103°, pulse 84, respirations 18. He had sordes on the lips and appeared dull, apathetic and dehydrated. There were a few harsh rhonchi in the lung bases; his heart was a little enlarged. The abdomen was distended but not tender; the liver was palpable one finger's breadth below the costal margin and the spleen just palpable. There was slight icterus. There were no palpable lymph nodes. Examination of the rectum revealed nothing abnormal.

Investigations were as follows: X-ray chest and abdomen, negative. R.B.C. 2,720,000; Hb. 8.05 gm. Red cell sed. rate 128 mm. per hour. W.B.C. 5,500; differential normal. The bone marrow smear was normal except for slight eosinophilia. Serum bilirubin 3.5 mgm. %; direct 2.6 mgm. %; indirect 0.9 mgm. %. Urinary urobilinogen 11.4 Ehrlich units per 2 hour specimen. Serum protein 5.5 gm. %. Serum albumin 2.6 gm. %. Serum globulin 2.9 gm. %. Prothrombin time 18.5 seconds. Thymol turbidity 3.0 Maclagan units. N.P.N. 28 mgm. %.

Widal showed agglutination to the H antigens of typhoid and paratyphoid B., but no agglutination to the O antigens. Kahn negative. The liver function tests showed progressive deterioration.

He ran a continued temperature, averaging 103°. There were never any neurological signs until coma supervened before death. He remained icteric and developed congestion of his lungs before he died.

At autopsy the heart was slightly flabby but otherwise normal. The lungs were congested, reddish-purple and heavy. There was no pleural effusion. The mediastinal lymph nodes were not enlarged. In the abdomen there was no ascitic fluid. There were mucosal haemorrhages in the stomach, but the rest of the gastrointestinal tract was normal. Large gray soft retroperitoneal lymph nodes, 3 cm. in diameter, were present along the aorta and common bile duct, and a similar group were found in the right axilla.

The liver weighed 3,125 gm. and had a smooth surface. On section it was friable and somewhat mottled. A tiny, gray, soft nodule, measuring 5 mm. across was present on the upper surface of the left lobe of the liver. The spleen appeared normal and weighed 300 gm. The urinary tract was normal.

Typical Hodgkin's granuloma was seen in the enlarged lymph nodes and in small areas of the spleen and lung. The enlarged liver showed cloudy swelling of cells with actual necrosis in the soft gray nodule on the surface, but no evidence of Hodgkin's disease. There were regenerating liver cells. It seems likely that the jaundice, in this case, was due to compression of extrahepatic bile ducts by lymph nodes involved with Hodgkin's granuloma.

DISCUSSION

An acute form of Hodgkin's disease, characterized by mediastinal and para-aortic lymph node involvement without clinically palpable nodes, and a short febrile course with a fatal termination is well recognized, and the liver is often found to be involved at post mortem. But there do not appear to be any reports of cases where

liver failure was the presenting symptom and predominant feature leading to death.

Goia¹ states that the liver is often enlarged in the advanced stages of malignant lymphogranulomatosis, usually only slightly, but in rare cases it is greatly increased in size. He goes on to report two cases, but in both of them the hepatomegaly was a late stage in a chronic illness.

Berger and Lehman² report a palpable liver in 20 of their 54 cases, but with clinical icterus in only two, and liver failure does not appear to have been a feature.

Jackson and Parker³ divide Hodgkin's disease into three clinical and pathological types of increasing severity; paraganuloma, granuloma and sarcoma. In paraganuloma they state that involvement of the internal organs appears to be rare. In granuloma they say the liver is frequently affected but massive enlargement is rare; that bile stasis does occur, resulting in jaundice, but is unusual. In sarcoma they state that, on the whole, the liver is somewhat enlarged, but no larger than normal and they do not mention jaundice.

The first two cases here presented seem to fall into the sarcoma group, and the third into the granuloma group.

I wish to thank Drs. J. A. Berkeley and E. M. Wilder for permission to publish these cases; and Dr. P. S. Rutherford for help in compiling this report.

REFERENCES

1. GOIA, I.: *Bull. et mem. Soc. med. d. hop. de Bucarest*, 14: 493, 1932.
2. BURGER, R. E. AND LEHMAN, E. P.: *Arch. Surg.*, 43: 839, 1941.
3. JACKSON, H. JR. AND PARKER, F. JR.: *New England J. Med.*, 231: 35, 1944.

BALANTIDIAL DYSENTERY

G. B. ELLIOTT, M.B., M.R.C.S.,* and
R. HOTSON, R.T.,† Brandon, Man.

DYSENTERY due to *Balantidium coli*, the largest and sole ciliated parasite of man, was first described in 1857 by Malmsten.¹ Fewer than five hundred cases have accrued in the literature, and the disease is considered a rarity.

The purpose of this paper is to describe one clinical case encountered in Manitoba, the

second formally reported in Canada. The distribution is probably much more widely spread, for the parasite has been reported by the Provincial Laboratory Directors of Ontario, Quebec, and Nova Scotia, to the chief of the Laboratory of Hygiene in Ottawa in personal communications.²

After 27 years institutional care, an inaccessible male schizophrenic patient, with coprophagic habits, developed dysenteric symptoms, at the age of 49 years. His first attack of diarrhoea occurred in December 1941, with passage of some blood, and lasted two days. A second attack with intermittent pyrexia up to 100° F. began in December 1943, and lasted two weeks subsiding spontaneously.

In April 1946 severe diarrhoea appeared with about ten stools daily, mild abdominal colic and intermittent pyrexia up to 100.8°. Complete blood count showed no changes, and blood urea nitrogen was 17 mgm. %. There was no response to sulfaguanidine and little symptomatic relief from opiates. The attacks subsided spontaneously after six weeks.

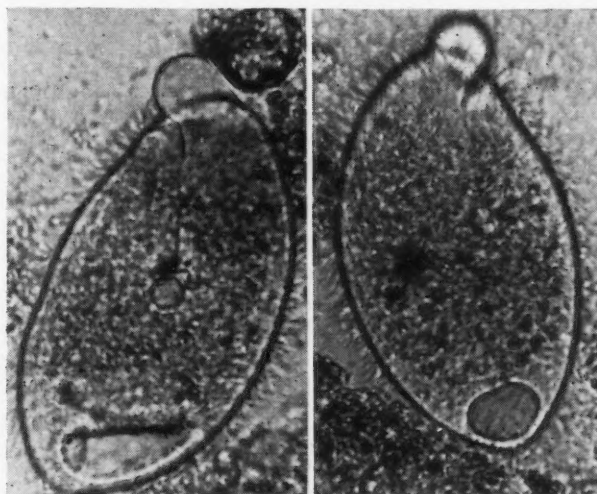


Fig. 1

Fig. 2

Fig. 1.—*Balantidium coli* trophozoite (x 1450). The peripheral cilia, primitive gullet, and nuclei are in the same plane of focus. Fig. 2.—*Balantidium coli* trophozoite (x 1450). Striated pellicle of anterior pole, a contractile vacuole, and a lobe of macronucleus are visible.

Faecal examinations were not made in any of these episodes. The patient remained disinterested in his bowel habits, so that mild diarrhoea could not be detected.

In September 1951 he was found to have lost ten pounds in weight, had about ten fluid bowel movements daily, with apparent abdominal pain, but apart from some reddening of the lower rectal mucosa there were no abnormal physical findings. Blood examination showed 5.0 million R.B.C., Hb. 82% (12 grams), C.I. 0.8, 6,100 W.B.C., with polymorphs 70%, lymphocytes 23%, eosinophils 5%, monocytes 2%. During the following two months unremitting dysentery persisted despite four courses of sulfaguanidine at intervals totalling 50, 53, 80, and 30 grams respectively.

Procaine penicillin 1.5 million units intramuscularly spread over five days had no effect, and considerable doses of opiates gave little relief. Only a bulk free diet would reduce diarrhoea. In late November the patient was extremely weak, but still afebrile. Intravenous glucose saline and protein hydrolysate therapy was begun. Blood examination showed 2.9 million R.B.C., Hb. 52% (7.3 grams) 6,000 W.B.C. with polymorphs 54.5%,

*Pathologist, Department of Health and Public Welfare, Province of Manitoba.
†Senior Technician, Laboratory, Brandon Hospital for Mental Diseases.

eosinophils 3%, basophils 2.5 %, lymphocytes 38%, monocytes 2%. Six anal swabs sent at intervals for culture had all shown predominant growth of *Pseudomonas aeruginosa* and *Proteus vulgaris*, probably an effect of therapy on the other flora.

On November 30, muddy brown, watery, fresh stool showing particles of mucus but no blood was submitted. Direct films showed an average of eight active Balantidial trophozoites per high power field (Fig. 1 and 2). Occasional mononuclear cells were present. No amoebæ, cysts, helminths or ova of any type were seen. Culture yielded no pathogens. Diagnosis of the pathogenic parasite was confirmed by Dr. Harry Williams, Pathologist, Deer Lodge Hospital, Winnipeg, who suggested treatment with Carbarsone (Eli Lilly Co.), an arsenical compound used in amoebiasis.

Beginning December 12, 0.25 gm. of Carbarsone were given twice daily by mouth, for ten days, together with 6.0 gm. of sulfaguanidine daily for concomitant ulceration. The trophozoites persisted in large numbers in the faeces over the next two days, but on the third day none were found. Diarrhoea steadily diminished, and disappeared on December 21.

A second similar course was given two weeks after the first, and the patient was in good physical health by January 16, 1952. Weekly faecal examinations during the subsequent nine months have shown no recurrence of the infection. Samples of gastric juice have shown complete achlorhydria after histamine injection.

No other cases have been found among the patient's present contacts. No Balantidial trophozoites and only one cyst was found in soft excreta from thirty pigs selected at random on the hospital farm, and none of the four men working with them have shown any evidence of the infection. Being mentally unfit to work, the patient was never in contact with farm animals since his admission.

LABORATORY IDENTIFICATION

Apart from identification of the parasite in fresh dysenteric stool specimens, laboratory findings are not characteristic. Balantidia are best detected by searching thin wet unstained faecal films or suspensions at low magnifications. Fixed smears stained in iron hæmatoxylin are not so satisfactory, except as a permanent record. While trophozoites may literally swarm in specimens taken during exacerbations, they usually appear intermittently and never in formed stool. The cysts can appear at any stage, but concentration methods for their detection destroy motile forms.

The rigid ovoids of the Balantidial trophozoites reach 100 microns in length and 70 microns in width. The egg-shaped protozoon has a refractile glassy pellicle uniformly covered by delicate longitudinal grooves, each bearing a row of short cilia in constant shimmering movement. These striations form a gentle clockwise spiral converging to the funnel of the primitive gullet which is eccentrically placed on the narrower anterior pole. Those cilia lining the peristome are longer and maintain a rapid inward swirling which wafts particles into the cell. The smooth

spiral rotation of the parasite brings the peristome into view at regular intervals, and is quite distinct from the jerky motion of the larger intestinal flagellates. In the granular endoplasm are a characteristic large bean-shaped macronucleus with a small round micronucleus usually situated in its concavity. Two ill defined contractile vacuoles are also present, the posterior discharging through the minute axial anal pore.

These microscopic features will distinguish *Balantidium coli* from numerous superficially similar free living coprophilous infusoria which can contaminate faecal films, leading to mistaken diagnoses.³ Such ciliates will grow in laboratory dropping bottles of distilled water or isotonic saline. Some pass through the human intestine as cysts, developing into motile forms, after passage. For these reasons immediate examination of direct films is preferred.

Motile Balantidia disappear progressively from faeces. In our case they persisted in decreasing numbers for three days at room temperature. This is a useful confirmatory feature, for the free living ciliated contaminants multiply steadily in this time. Balantidial cysts are round, reaching 65 microns in diameter, with a slightly motile characteristic *Balantidium* contained within the doubly contoured refractile wall.

SYMPTOMS AND TREATMENT

The typical history is of intermittent mild watery diarrhoea with exacerbations of increasingly severe dysentery. Pyrexia is seldom marked and physical findings may be entirely lacking. In the acute stage mortality of untreated cases is around 30%. Asymptomatic cases are sometimes seen, or long remissions may be present with mild hypochromic anaemia only. The cause of this variation is unknown, although in experimental balantidiasis of guinea pigs multiplication of the parasite is favoured by carbohydrate feeding and inhibited by protein diets.⁴

Bowel lesions closely mimic those of amoebic colitis in distribution and appearance at all stages. While Balantidia penetrate veins and lymphatics of the colon, liver abscess has never been described.⁵ Apart from this, the clinical similarity to amoebiasis is striking.

No specific drug treatment has been found. Amoebicidal arsenicals such as Carbarsone and Acetarsol have been used with the most success.

DISTRIBUTION

The parasitosis has been described sporadically from almost every country except Switzerland. Manson Bahr⁶ mentions only one case in England, while 43 are reported from the United States up to 1939.⁷ The largest series have been discovered during the course of public health investigations, notably those made by large oil and fruit corporations in the tropics.^{8, 9} These series have occurred in crowded native communities, living in poor hygienic circumstances. Surveys of large numbers of soldiers convalescent from dysenteries, in these climates, have shown a minute incidence of balantidiasis.¹⁰ In temperate latitudes small outbreaks have been reported, chiefly among psychotics, notably by Young in South Carolina,⁷ and Ferri in Tomsk.¹¹ Both instances described from Canada concern psychotic patients.¹²

Many authors note the low level of personal hygiene, overcrowding, and helminth infestation associated with their cases.

Epidemiology.—The epidemiology is controversial. Shortly after Malmsten's report, Leuckart¹³ identified *Balantidia* in swine. The majority of pigs usually carry *Balantidia* trophozoites as commensals in the cæcum, but the distal bowel is very rarely infested and indeed cysts are very seldom found.¹⁴ However, in the apparent absence of human carriers this led to an assumption that swine were the natural reservoir of human infection. No direct evidence of transfer has been produced and experimental transmissions from several animal sources to man have failed.⁸ Morphologically similar *Balantidia* were formerly described in man, chimpanzees, swine, and wild rats.³ The identity of human and porcine species has been strongly denied on structural and cultural grounds by Ostroumov, and a number of distinct species of *Balantidia* are now confirmed in various animals. Roughly half the clinical cases have no contact history with pigs and McCarey recently described 87 cases of balantidiasis in Mohammedans. He discovered no intermediate hosts in the domestic animals of the region.

That pigs play no part in the epidemiology of the human balantidiasis is supported by the freedom of gut strippers and slaughter house workers from infestation.^{14, 15} From such observations it seems reasonable to suppose that any association

with swine is really indicative of the communal standard of living of those infected.

Formerly it was believed that cysts were the sole infectious agents. They occur in about one-fifth of human cases. Masing¹⁶ described complete achlorhydria after caffeine stimulation in twelve cases, and similar instances have been reported, including five associated with pernicious anæmia.⁷ Our own case has histamine achlorhydria.

No cysts were found in the 118 cases described by McCarey, and Ferri. Both concluded that transmission could occur in the active ciliate stage, and from man to man without the pig acting as intermediate host. Experimental transmission by cysts and trophozoites from man to achlorhydric volunteers has not been tried; attempts to use random human volunteers have failed, so that the circumstances determining infection remain uncertain.

SUMMARY

1. A second case of confirmed balantidial dysentery in Canada is reported, with discussion of laboratory and epidemiological data.
2. The infection occurred in a coprophagic psychotic patient, with complete achlorhydria, in circumstances favouring transmission from human sources.
3. There has been no relapse during ten months' observation after treatment with Carbarsone.

We wish to thank Dr. J. C. Wilt, Professor of Bacteriology, University of Manitoba, for assistance in preparing photomicrographs.

REFERENCES

1. MALMSTEN, P. H.: *Virch. Arch.*, 12: 302, 1857.
2. Personal communication of Dr. James Gibbard, Chief of Laboratory of Hygiene, Ottawa.
3. GRADWOHL, R. H. B. AND KOURI, P.: *Clinical Laboratory Methods*, C. V. Mosby Co., St. Louis, 4th ed., 1948.
4. SCHUMAKER, E.: *Am. J. Hyg.*, 12: 341, 1930.
5. KOPPISCH, E. AND WILKING, V. N.: *Puerto Rico J. Pub. Health & Trop. Med.*, 23: 185, 1947.
6. MANSON-BAHR, P.: *Synopsis of Tropical Medicine*, Castle and Co., London, 1st ed., 1943.
7. YOUNG, M. D.: *J. A. M. A.*, 113: 580, 1939.
8. MCCAREY, A. G.: *Brit. M. J.*, 1: 629, 1952.
9. AGUILAR: Cited by Cort, E. C., *J. A. M. A.*, 90: 1430, 1928.
10. MATHEWS AND SMITH: Cited by Little, J. L. (12).
11. FERRI, L. V.: *Trop. Dis. Bull.*, 40: 459, 1943.
12. LITTLE, J. L.: *Canad. M. A. J.*, 25: 653, 1931.
13. LEUCKART: *Weigemann's Arch.*, 1: 80, 1861.
14. OSTROUMOV, V. G.: *Trop. Dis. Bull.*, 44: 904, 1947.
15. FUSTHY, O. AND KIPSCHIDSE, N.: Cited by Koppisch, E. (5).
16. MASING, E.: *Klin. Wchnschr.*, 8: 2380, 1929.
17. YOUNG, M. D.: *Am. J. Trop. Med.*, 30: 71, 1950.

Clinical and
Laboratory Notes

RE-EXPANSION OF THE LUNG
TREATED BY ARTIFICIAL
PNEUMOTHORAX

T. G. HEATON, M.B., F.C.C.P., Toronto

WHEN IT HAS BEEN decided that therapeutic pneumothorax has been carried long enough, the physician undertakes the re-expansion of the lung. In some clinics refills have simply been stopped abruptly. In others, and probably in the majority, a gradual tapering off of the volume of the refill, usually with some lengthening of the interval, has been the method adopted to bring about a more gradual re-expansion.

were discontinued gradually. The volume of the refill was reduced by one-half or more while maintaining the interval between refills usual for each patient. If it was found necessary later to lengthen the interval as well as to reduce the volume of the refill, this was done. But lengthening the interval was avoided whenever possible.

The Civilians' group consists of patients treated at the Chest Clinic of the Western Hospital, Toronto. In this group the pneumothoraces were discontinued in the years 1943 to 1945 inclusive and the method employed at this time was often the abrupt discontinuance of refills. Only cases so discontinued are studied here.

The chief, and probably the only important difference in the composition of the two groups is the lesser extent of disease in the Veterans' group. This difference is explained by the fact that the majority of the veterans were diagnosed as the result of the taking of a routine x-ray film. There are considerably more women in the Civilian group.

TABLE I.

PATIENT MATERIAL											
Group	% male	% female	Average age	Age spread	Extent disease start of Px.				% Bac.	No. of Px's Stud.	No. of pts.
					Min. %	Mod. %	Adv. %	Unknown %			
Veterans.....	96.5	3.5	29	21-49	43	51	6	0	82	117	112
Civilians.....	46.7	53.3	25	14-54	15	57	28	0	76	112	105

TABLE II.

CASE MANAGEMENT								
Group	Pneumoth'x Discont'd.	Pneumoth'x %			Pneumono-lysis	Other collapse therapy %	Duration of Px. to start re-expan.	
		Rt.	Lt.	Bil.			Average %	Spread
Veterans.....	Gradually	53	38	9	32	9	41 months	12 to 91 months
Civilians.....	Abruptly	52	38	10	30	10	57 months	6 to 108 months

Failure of the lung to re-expand, and re-expansion with varying degrees of mediastinal shift or pleural reaction are common end results of the attempt to discontinue pneumothorax. This paper will attempt to establish the relative frequency and severity of these end results and to compare in this respect the abrupt with the gradual method of discontinuing refills.

The risks of the re-expansion period will also be weighed in each of these two methods of re-expansion.

MATERIAL STUDIED

Two groups of patients are here studied. The Veterans' group consists of patients receiving pneumothorax under the supervision of the writer at the Chest Clinic of Sunnybrook Hospital, Toronto, though not always treated there. In this group, discontinuance of pneumothorax was advised between December 1948 and January 1951 inclusive. All these pneumothoraces

Table II compares the groups from the point of view of case management.

It will be noted that the civilian group carried pneumothorax for a definitely longer period than the Veterans' group. The period of the study did not permit the use of chemotherapy except in one case in the Veterans' group. Chemotherapy was just beginning to be used when the latest of these pneumothorax cases were leaving sanatorium.

Table III shows the complications of the re-expansion period. The re-expansion period was considered ended when x-ray showed no remaining air in the pleural cavity even though in some cases pleural thickening or fluid occupied a section of the pleural cavity.

It is apparent from the Table that the abrupt discontinuance of refills is usually associated with fluid formation and that fluid is more likely to form in considerable amounts when refills are discontinued abruptly than when there is a

tapering off of refills. The numbers involved are too small to provide conclusive evidence, but it is noteworthy that empyema and hæmoptysis occurred during the re-expansion period only in the group in which refills were abruptly stopped.

As the writer has pointed out in a previous article,¹ re-expansion of the lung is always ac-

The attempt to re-expand the lung gradually permits the recognition of the unexpandable lung. The management of such unexpandable cases is another and a difficult problem.

REFERENCE

1. HEATON, T. G.: *Dis. of Chest*, 18: 324, 1950.

TABLE III.

COMPLICATION OF THE RE-EXPANSION PERIOD						
	Fluid slight %	Fluid considerable %	Empyema	Contralateral spread %	Homolateral spread %	Refill reactions %
Veterans	17	6	0	1	0	1
Civilians	61	11	1	0	0	1

TABLE IV.

IMMEDIATE RESULTS OF THE ATTEMPT TO RE-EXPAND APRIL 1ST, 1952						
	Degree of expansion achieved		Still expanding or unexpandable	Decorti- cated	Duration of re-exp. period	
	Pleural shadowing and/or mediastinal shift				Average months	Range months
	None to mod. %	Marked %				
Veterans	72.6	17.1	6.8	2.5	6.2	1-37
Civilians	54.0	46.0	0	0	7.0	1-18

companied by trauma to a thickened visceral pleura, because as the lung expands, its surface area must increase and this can only occur by splitting or stretching the fibrinous layer deposited upon the visceral pleura. This trauma, rather than the negative pressures of the re-expansion period, is thought to be the reason for the formation of fluid at this time. It seems likely to be safer to produce such trauma a little bit at a time. Table III shows that in fact fewer effusions occur when this is done.

Table IV shows the immediate results of attempts to re-expand the lung in the two groups.

"Marked pleural shadowing" was interpreted when pleural shadow reached a depth of 1" in any part as shown in a postero-anterior view on a 14" x 17" x-ray film.

"Marked mediastinal shift" was interpreted when the right border of the heart reached the left border of the spinal shadow on a similar film. This finding occurred only two or three times and was always associated with "marked pleural shadowing". Marked shift did not occur to the right in this series.

CONCLUSION

Refills should be discontinued gradually. If refills are discontinued gradually, there will be fewer complications in the re-expansion period, and less residual pleural thickening and less mediastinal shift than would occur if refills were stopped abruptly.

CHLORINE IN DISTILLED WATER

H. B. COLLIER, Ph.D., F.C.I.C. and
R. D. STUART, M.B., Ch.B., M.D., D.Sc.,
D.P.H., F.R.F.P.S., Edmonton

RECENTLY in the Provincial Laboratory of Public Health unexpected interference with bacterial viability was noticed in suspensions in non-nutrient media. The difficulty was traced to the distilled water used. The city of Edmonton uses the chloramine process for the sterilization of the water supply and Mr. H. Graham, former city chemist, suggested that chlorine might be present in our distilled water.

Both the Provincial Laboratory and the Department of Biochemistry use the same type of reflux still which is supposed to produce a high quality of pyrogen-free water. Tests with o-tolidine revealed that the distillate from these stills did in fact contain appreciable concentrations of available chlorine. Stills of other makes in other laboratories here have been found to give distillates that are chlorine-free.

Analyses carried out in the Department of Biochemistry over several weeks indicated that the level of available chlorine in the tap water is about 0.5 p.p.m. while that in the distillate has been 0.3 to 0.4 p.p.m. This is sufficient to interfere with micro-iodometric titrations and with certain enzyme studies.

(Concluded on page 342)

The Canadian Medical Association Journal

published monthly by

THE CANADIAN MEDICAL ASSOCIATION

Editor: H. E. MACDERMOT, M.D., F.R.C.P.[C.]

Editorial Offices: 3640 UNIVERSITY ST., MONTREAL

(Information regarding contributions and advertising will be found on the second page following the reading material.)

Editorials

THE TRAINING OF NURSES

The discussion in General Council at Winnipeg on the nursing situation in Canada is a good index of the interest with which this problem is being followed by our profession. It also brought out the difficulties to be overcome. Our Association has co-operated for some years now with representatives of the Canadian Nurses Association and of the Canadian Hospital Council, to form a Commission for studying nursing services in Canada. It is a rather complex situation. For example; who is responsible for the training of nurses—in the same sense that medical schools are responsible for the training of physicians? That question was asked in Council, but no one could supply the answer. Naturally, training schools for nurses do the work of training, but if the *supply* of nurses falls below the needs of the community, to whom are we to look for the remedy? One suggestion (made by Dr. Morley Young) was that Provincial Departments of Health are in a favourable position to assess the need of nursing services and that they have a responsibility to adjust supply to demand.

The Nurses Association is fully aware of the shortage of nurses, but by itself cannot deal with it. Many factors are involved. From the economic aspect nursing is at a severe disadvantage nowadays. Girls on leaving school can at once begin earning money in business offices at a rate which they are unlikely to forego for the unproductive period of training to nurse. Is the appeal of nursing as a profession losing its power? Is the course of training too long? Are the nursing authorities themselves united in their views on training? Are nurses being drawn off

to work in industrial medicine, or in doctors' offices, or in other positions which hardly require such specialized training as most nurses now receive?

The problem is much more acute in smaller than in larger centres.

But while attempts to increase the supply of candidates are being made, a major problem remains in the financing of their training. It is with the consideration of this that the Commission has been most deeply concerned. Two alternatives have been suggested. One is to obtain financial help from Foundations interested in health; this could perhaps be used to establish a staff for the Commission which would continue its work on a voluntary unofficial basis.

The other suggestion is the establishment under Federal auspices of a body which would undertake to provide for nursing the organization and public funds required. The Commission favours the latter suggestion, but no steps have been taken toward its implementation.

It appears then that the pressing needs are for critical examination of the nursing curriculum, sustained efforts at recruitment, and probably the expenditure of public funds to fill a public need. General Council reached no conclusions on this complex and difficult situation, but the interest displayed will encourage the representatives of our Association on the Canadian Commission on Nursing to pursue the problems with renewed enthusiasm.

Editorial Comments

THE PLACE OF THE CHIROPODIST

It is not so much to be wondered at that the foot has never received the attention which has been bestowed on the hand. Aesthetic reasons may be partly responsible for this, even as they are for many other discrepancies. But even in the medical field where aesthetics would not play such a part, there is still a rather curious tendency for ailments of the feet to be regarded more casually than they should be. The foot has been referred to as one of the unexplored areas in medicine. It might even be called the Cinderella of our profession, except that her foot problem did happen to receive very special attention! In any case our profession seems to have been slow in encouraging the development of a specialty dealing with diseases of the feet. Morton, who

can speak with authority, holds that "The foot is the only part of the body for which prevailing ideas of care and treatment have remained practically the same for forty years."

This anomalous state obtains chiefly in the field of minor ailments, so far as it may be correct to speak of ailments as being minor. A gangrenous toe will be the subject of intensive investigation by most skilled and experienced internists. But a sore foot or a corn, while admittedly less immediately serious, can still be a crippling condition for large numbers of people, and yet will not receive anything like the proportionate degree of skilled attention by the same highly trained men.

Signs are not wanting, however, to show that the lag of which Morton complained is being gradually overcome. Not only are there more textbooks dealing with the foot, but chiropody is slowly but surely establishing itself. The chiropodist is no longer only someone who extracts corns, useful as that may be. He is now a trained professional man, with professional and ethical standards like our own, and based on rigid training. He undergoes four years of training, with high pre-academic requirements and is trained in the basic sciences of anatomy, physiology, pathology, etc. He specializes as does the dentist in a limited field of the body outside of which he does not venture.

It is clear then, that the modern chiropodist is a specialist in his own right. Why is it that in many parts of Canada he does not receive proper recognition? Many of the largest and best known hospitals in the States have chiropody clinics, and would not do without them: *e.g.*, the Mayo Clinic, the Massachusetts General, Philadelphia General, etc. In Canada, however, only a beginning has been made towards their official attachments to hospitals and clinics. Some three years ago a Chiropody Clinic was established in the Vancouver General Hospital, and since then the clinic has become indispensable. St. Paul's Hospital in the same city more recently has followed this example with similar gratifying results. Other large centres, however, have yet to see the light. It may be that the supply of trained chiropodists cannot meet the demand, but it is more probable that hospitals are not making as much effort to fit them into their staffs as they might. The increasing numbers of patients in the older age brackets will inevitably add to the work in care of the feet. This should be an addi-

tional stimulus towards developing an acceptance of the value of the trained chiropodist which is long overdue.

INFORMATION DIGEST

We note with great interest the July issue of *Information Digest* published by the Central Council for Health Education, London, England. It was originally planned as a handbook for students at the summer school of the Central Council for Health Education, but the contents quite naturally fall into the category of a periodical news science. The variety of extracts will provide interest for a wide range of readers. The present issue covers "Rheumatism" in all its hydra-headed aspects: "Child Welfare Centres"; "Vital Statistics" and various Health Education Activities. Altogether a very useful and well arranged collection of extracts.

LIPOTROPIC THERAPY IN ATHEROSCLEROSIS

The value of lipotropic agents in the treatment of nutritional fatty cirrhosis of the liver and coronary atherosclerosis is under constant investigation, and conflicting results so far have been obtained. This may be because of our incomplete knowledge of the fundamental mechanisms of lipid metabolism. Recent studies by Morrison* were concerned with the action of lipotropic substances in fat absorption and fat tolerance in human beings, and later with their effects in atherosclerosis. Three groups were studied; (a) "normals"; (b) a number of cases of coronary atherosclerosis; and (c) patients with miscellaneous diseases. A lipogram technique, using Frazer's method of chylomicron and lipomicron counts was employed to evaluate the effects of lipotropic agents.

Such lipotropes as choline and inositol were first used. Choline gave variable decreases in chylomicron counts in the controls and more significant changes in the atherosclerosis group. Inositol showed no significant changes. However, a combination of synergistically acting substances was then tested in the form of Methischol, which is a combination of choline, methionine, inositol, vitamin B₁₂ and liver. This was found to be more effective in reducing chylomicron and lipomicron counts than choline or inositol alone.

In a further study Methischol plus a low-cholesterol low-fat diet over a period of six months had the effect of restoring the phospholipid/cholesterol ratios to normal levels. There was an associated improvement clinically and a sense of well-being, but the psycho-therapeutic implications of lipotropic therapy in coronary atherosclerosis are wisely pointed out.

*Lipogram Studies in Coronary Atherosclerosis; and Serum Phospholipid-cholesterol ratios in coronary atherosclerosis, Morrison, L. M., *Angiology*, 4: 123 and 130, 1953.

Men and Books

BY APOLLO*

E. P. SCARLETT, M.D.,† *Calgary*

"I swear by Apollo . . ."

THIS IS AN OPPORTUNE TIME to consider some ideas which are of concern to all members of our profession and have a peculiar propriety in the councils of this Association. The conscious and ostensible motives of this annual meeting now more than three-quarters of a century old are of the professional, social and business order, immediately practical matters. Behind these activities, however, there is I think a less evident and deeper wish to give assertion to our profession's strength and solidarity and for a short season to see and experience the profession as a whole. The most intense and careful workman will from time to time stand back to get a more general view of his work and to consider and review its wider relations. Such an exercise is necessary if he is to escape the tyranny of detail and the limitations of the short view. This is particularly true in the case of the physician, for the institution of medicine lives and can survive only by virtue of its corporate unity and its wide dimensions. For this reason I am bold enough at this time to put forward some ideas which may appeal to your imaginative attention, will not disturb your scientific temper and may commend themselves to your tolerant understanding.

My justification for these remarks may perhaps be found in the necessity for considering the profession of medicine in a challenging age, but even more so in Matthew Arnold's dictum that two-thirds of life has to do with conduct. Certainly this observation is true in medical practice where two-thirds of a physician's achievement and success depends on conduct and character and a bare one-third on technical skill. I shall concern myself with thoughts and problems in that territory which lies between medicine on the one hand and the kingdoms of religion, tradition and history on the other. I hope that I may be able to relieve my listeners from that acute embarrassment and furtive discomfort which any mention of ethics and philosophy invokes in Anglo-Saxon physicians.

On an occasion of this sort I would conjure up the shades of Linacre, the scholar-physician who founded the Royal College of Physicians, the robustious Rabelais who professed to scorch the snouts of all unbelievers, the grave Thomas Browne who combined daily medical practice and memorable philosophical thought and speech, the tender John Brown of Edinburgh

who loved "all things, both great and small", and the deeply understanding Osler and Allbutt of our own time.

THE CURRENT WORLD SCENE

We are living in a time of total crisis matched by few periods in the history of the human race. Over many areas of the world a serious collapse of civilization has taken place. To the chorus of the roaring of jet engines we are witnessing global disorder and savagery behind the monstrous and ironical make-believe of so-called peace. No ultimate and real security encloses the spirit of man such as characterized the Victorian age when, in Wilfred Trotter's phrase, "Matter still sat contentedly in its little hard globular and indestructible atoms".

What concerns us most of all and is so distressing to men and women of our persuasion is that the absolutes and standards created by man in his long pilgrimage on this earth have been undermined or destroyed. The old certitudes have become hidden by the dark mists of nationalism, prejudice and intolerance. The sanctity of the individual and the authority of knowledge have been contemptuously cast aside in a naked expression of power, cunning and destruction. There seems to be abroad a wild and perverse desire for something different and, as George Santayana put it, "a deep, dark impulse to destroy everything that has the impertinence to exist".

Enveloping all is the tragic mood of Fear which is at the basis of all the tensions of the moment—a fear which serves to point up the tragic human predicament, the unsolved problem of human relations and to cripple and deflect human activities whether of individual or nations.

The hope which at the beginning of this century fired men that science and the scientific habit of mind would lead to a new order was given its tragic answer in two global wars. As a further object lesson in this regard there has been the failure of German scientists and doctors to vindicate the empire of reason and education, one of the cultural tragedies of our time. German liberal education and medicine waxed fat like Jeshurun and yet committed suicide. Why? If we had the answer we would be close to the diagnosis and treatment of our present ills.

These matters are intensely our concern as physicians whose business it is to be aware of the moral perplexities and dilemmas which afflict individuals. We know that man cannot be disinterested. He is a creature with a will and a sense of purpose, not a helpless puppet of the gods. He has glands, but he also has a conscience. Neither can he live by technology alone. Man is a moral creature who has here no abiding city. This ancient humanistic wisdom of our profession no less than the appalling human situation of our age call upon us to assert these

*Address to the Annual Meeting of the Canadian Medical Association, Winnipeg, June 18, 1953.

†Chancellor, University of Alberta, Edmonton.

things in the face of the supreme tragedy and folly and pathos that surround us.

MEDICINE IN THE PRESENT AGE

With these thoughts in mind it becomes a matter of the greatest importance for the physician in the light of history to look at his situation with regard to society, to examine his relationship to the world, to governments, to his patient, and to his technical tasks. He must do this the more so because contemporary society will give him little attention but rather will continue to impose restrictions and exact responsibilities without regard to the real values of the profession.

Medicine has been through major ordeals before. We recall Greek medicine in Rome, the medicine of the Middle Ages. It emerged by virtue of the scientific spirit of its laboratories and the standard of devoted service in its practice—those two great golden strands in the fabric of our history. We should realize too that medicine has come to its present stature and commands its present public confidence only in the past seventy-five years. In historical perspective, therefore, medicine as you and I know it is really a recent phenomenon and could easily be destroyed. It must not be allowed to succumb to the diseases of our age—intellectual and spiritual disorder with attendant paralysis of moral standards, loss of professional cohesion with resulting growth of self interest and a narrow trade-union spirit.

Our relation to governments is worth noting. Traditionally medicine has had no direct and little indirect part in the sphere of government. It has therefore had to submit to having its duties levied as occasion arose with very little accompanying compensation of privilege or immunity. It has enjoyed very little of the immunity of the "silk" of the law or the "cloth" of the clergy. Now when it has become an accepted proposition that medical care has a unique importance in social life, and society is insisting that the individual has a right to medical care in the same way as to education and police protection, our profession finds itself in a most vulnerable position, commanding little social prestige, and the least privileged, the most exposed and the hardest worked group in society.

Here is the real challenge to medicine in our day, a challenge to be met fairly and not bewailed. We are a profession that in a torn and strident world offers a life in which it is possible to pursue an ideal, that ideal being that an occupation worthy of the name should demand intellectual freedom, should afford more opportunity for character than cleverness and should provide "tonic and bark" for mind and soul in perilous times. The dignity of our profession rests not on social distinction or privilege but on doing a man's job in which the chief demands are on character, matured power of judgment and indefinable powers of intuition.

There are many pressures on the profession above and beyond the pressure of emergency which is always present in medical practice. The socialized order and the demands of what is colloquially called the welfare state with its twin dangers—the damping of individual enthusiasm and the tyranny of mediocrity; the demands of an arrogant and ill-informed proletariat in which any "dull and muddy-mettled rascal" may choose to call the tune; commercialization making physicians hawkers in the Hippocratic bazaar; specialization which, properly balanced, is the means by which modern knowledge is first attained and then applied, but which if abused makes physician and patient the victims of the scientific ritual; the newer psychological knowledge which has produced a change in our thinking in purely materialistic terms. Add to these the minor damnabilities of the tyranny of the telephone, the distressing results of popular medical education, the cult of the certificate—and the catalogue is complete enough to satisfy the most gloomy medical philosopher.

In these ways and others the full tide of human needs and change bears down daily upon the medical man. These demands must be met in the course of activity with little chance for reflection to plot strategy. For Medicine abhors spare hours like nature a vacuum. It seems that with the continuing evolution of medical practice every physician, like the Red Queen in *Alice Through the Looking Glass*, has to keep running if he is not to lose ground. It is little wonder that in a mood of weariness many a physician echoes the words of old Doctor Pycroft: "When I die I shall have a bell hung on my head-stone with an inscription asking the compassionate passer-by to ring it loud and long. And I shall not get up."

I shall say little of the evils and abuses in our ranks. The important thing is not that certain practices prevail but that so little seems to be done to move against them. There are men who keep clear of the graver evils but whose offence is not against the law but the spirit of medicine. These are the ones who have a commercial point of view, who are out for what they glibly say is all the traffic will stand. Even a few such men in our midst ruin the reputations of all. They destroy in an instant the good name of the profession built up through generations. Because of them medicine "once a Science, is become a Trade". These people are doing more to force state intervention in medical circles than any other agency. To oppose them the profession must exert what I may call *the physician's imperative*—the assertion of the standards of medicine by example, moral force and stern measures by our own organizations.

THE BROAD FOUNDATIONS OF MEDICINE

Those standards rest on firm foundations. It is generally agreed (and sometimes forgotten by medical men themselves) that the ethics and

assumptions of accepted medical usage both in theory and practice represent the highest professional standard now recognized in our society. Traditionally one of the three learned professions, we have established the pattern of a true profession by service to society. And "a true profession exists only as the people allow it to maintain its prerogatives by reason of confidence in its integrity and belief in its general beneficence" (Vannevar Bush).

In this mission medicine has always taken its stand on the basic thesis of the immediacy and intimacy of the relation between the single doctor and his patient, defending that relation against the intrusion of outsiders and the state itself. Whether it can defend this principle through this era of radical social change remains to be seen. We would do well to remind ourselves that in this attitude is rooted much of the public's confidence in our profession, vindicating as it does faith in the value of the individual. It is of further interest to note that observers at the Nuremberg medical trials, the nemesis of modern German medicine, felt deeply that such a principle is our anchor to prevent us drifting on to the reefs of the all-powerful state.

The best philosophical exposition of modern medicine is still Claude Bernard's *Introduction to the Study of Experimental Medicine* (Paris, 1865). Here are set out the foundations of the science and art of medicine. Medicine is a practical art and not an applied science like electrical engineering as is often suggested. As such it requires the knowledge of science but at the same time it needs every faculty of the physician to put that science to work—sympathy, observation, intuition based on experience, knowledge of human beings who are not always rational nor even at times reasonable creatures. The medical man thus must exhibit the knowledge and trained skill of science together with "the imaginative intensity" of art. He must have in his nature a shrewd streak of the confessor, the counsellor and the sage. Little does he know of medicine who only medicine knows.

In these days the physical ills of man are being seen in a constantly widening context. We have returned to the old psychosomatic viewpoint. This attention accorded to psychological elements in disease is no new thing. In the eighteenth century Benjamin Rush of Philadelphia listed emotional tension growing out of social situations as a common cause of sickness and declared that, in an age addicted to theology, even the memorizing of too many sermons might bring on serious illness.

In an age of social unrest and change the social implications of medicine are beginning to press upon us, and we can no longer isolate ourselves in the pathological laboratory or the consulting room. Medicine must join with the social sciences, philosophy and the humanities in the defence of human values and in solving the

many social and economic problems in our midst.

While still thinking of the broad foundations of medicine I should like to urge a return to the old clinical medicine with its sturdy independence and its excellent discipline at the bedside. We have got into the habit of depending too much on laboratory methods and experimental medicine and surgery and are tending to lose that clinical sense which has been the hall-mark of British medicine since the time of Sydenham. It is in the clinic and at the bedside that we should be asking the questions. Such a discipline with conclusions based on the large range of recorded clinical facts should provide new ideas and valuable approaches to the commonplaces of every-day practice which for the most part are ignored by the specialties and the physiologists.

OUR DUTY AS A PROFESSION

So far I have been dealing in broad generalizations and sweeping perspectives. We have been discussing the world scene and its implications for medicine, the pressures which society is presently exerting on the profession, and the broad foundations on which medicine rests as it carries on its task today. We have set the stage—a troubled and turbulent world; we have brought the drama before us—far-reaching social, economic and political changes moving no man knows where. It is time that we considered our own rôle on this stage as a medical profession in Canada and as individual actors in the drama, cast in our various parts as practising physicians.

What is our duty? What are the fundamental things that must guide us in discharging that duty? On what ultimate authority do these fundamentals rest? These are practical and vital questions that concern every one of us no matter what his position in the medical fraternity.

Our duty, first of all. Two things at least. First: We must express what we feel is necessary and not what we are told to express by the planning authorities. No one knows better what medicine means and involves than physicians. It is a disastrous departure from that knowledge for medicine to be parasitic for its ideas and its ideals on the state, business or society at large. Anything less is a betrayal of our heritage and a sin against the holiest thing in medicine—the spirit of sympathy armed with understanding. Second: We must impose a discipline on ourselves, rather than accept one from without. You tell me that our professional life has its sordid side, that we have moral weaklings in our ranks. Granted—but there is an infinite difference between maintaining a standard which is occasionally abandoned, and affirming as the central truth of existence that there is no standard to maintain. The physician's standard has been slowly and painfully gained in the teeth of hostile forces. Every doctor knows what it is. It

is our part as individuals and a group to maintain it.

The public at times thinks of the average physician as a happy mixture of intellectual innocence and worldly wisdom, but, when that same public is ill it expects from the physician integrity, humanity and skill, and it is precisely because it has not looked in vain for these things that medicine is still an independent group in society, holding its own councils and governing its own members. There is much talk in these days of justifying medicine by its benefits to society, prolonging life and so forth. These things are self evident. But the real justification of medicine lies at the deeper level—it is that in spirit medicine has never failed the individual, its concern has been with the spirit of man, a mission which it shares with religion.

In discharging these items of duty there are bound to be difficulties and a social controversy. These can be resolved with patience and firmness. There is no need to emulate the choleric individual who in the course of controversy takes on the clinical appearance of a patient suffering from belladonna poisoning described by an earlier clinician as being "hot as a hare, blind as a bat, dry as a bone, red as a beet and mad as a hen".

And this duty must not be carried out in a slack fashion. We must not fall into the danger of living on the capital of goodwill and idealism built up by past generations of men in our profession. When tempted to do so we should remember the high example of teachers in our schools of medicine and of scores of inarticulate, hard-working medical practitioners working in small and remote places in this country. They are the ones who are renewing the store of medical idealism which forges the weapons of social duty.

THE FUNDAMENTALS OF MEDICAL PRACTICE

What are the fundamental things that must guide us in discharging this duty? They are simple, absolute, compulsive. They cannot be tailored to suit any time or any individual's convenience. They may be stated in different terms but to one physician at least they are: respect for man, personal integrity, the virtue of work, the dignity of our profession, deep interest in the craft as a high adventure and an imaginative art—all crowned by Osler's more intimate prescribed qualities, the art of detachment, the virtue of method, the quality of thoroughness and the grace of humility. These are the things which have given our calling its strength and which have made it one of the activities of the human spirit which have brought man out of the original darkness.

THE ULTIMATE AUTHORITY IN MEDICINE

On what ultimate authority do these fundamentals rest? Ultimately on the faith of the indi-

vidual doctor, of you and me, and of his pride in his calling. When faith warms medicine, then the intellectual interest and pleasure is exalted into a principle, invested with a strong moral motive and passes into the heart. How to reconcile the tragic spectacle of events and the heedless march of the natural forces of disease and accident, of time and chance with the things that give life meaning—duty, sense of vocation, belief in the providence of God, is a problem that is as old as humanity itself, older than Job, and is a task that taxes a man to the heights and depths of his nature. In the context of science and faith in which we as physicians find ourselves, the only certainties on which we may rest are certainties that science can do little to suggest or maintain. They are not within its domain. Rather it is in the faith that is in us, not as physicians or scientists, but as men that we may meet with courage and resolution the problems that Time's web unfolds.

The nature of that faith rests ultimately on the conviction that there is some meaning and value in life. In these days it is not easy to attain to such a belief. The old established certitudes appear to be in flux. Truth is fragmented, each science and calling cultivating its own plot. Man is fragmented—economic man, industrial man, Freudian man, the ill man if you will. But each of us, if he is not to be a helpless nihilist, is compelled to make a deliberate choice and to work for the belief of his choice. And not the least the medical profession, for its members are accepted as advisers in much more than health. In creating such a faith the medical man may be reminded of a phrase of Hippocrates, the Father of Medicine—the love of humanity (philanthropia) coupled with the love of his craft (philotechnia). In this union is forged faith and in the end wisdom.

The authority in medicine of which we have been speaking has been given strength and deep foundations in the earth by the great physicians of the past. As Osler reminded us, in no other profession has there been found so large a number of men who have combined intellectual pre-eminence with nobility of character. Their work and example not only have set the pattern of our daily activities, but have given broad dimensions to the profession's empire of consciousness. The average doctor working at prosaic tasks in operating room or office within what Stephen Paget called "the ring-fence of materialism" commands not only the accumulated knowledge of the past but the compelling stimulus of great examples. He is attended by a mighty cloud of witnesses. As an example let me remind you that this year we are commemorating the four-hundredth anniversary of the burning of Michael Servetus—wandering scholar, stormy debater, anatomical prosector, mystic dreamer, faithful town physician and discoverer of the pulmonary circulation, one of the great company of medical immortals. Ours is a great tradition and the indi-

vidual physician gains something by taking a pride in it. For tradition is not a memento in a glass case but the root and trunk of an organic thing. If in carelessness or forgetfulness you sever the trunk, the tree dies.

CONCLUSION

One of the features of twentieth century medicine has been a return to the spirit and practice of Hippocrates and in its psychological aspects to the cult of Æsculapius. We can quite truthfully say as a profession, quoting the famous words, "In our end is our beginning". The Greeks created rational medicine, and in the Oath of Hippocrates which as far as I can find has no parallel in the history of morals, they set out the conception of the profession which should possess three supreme qualities—a sense of vocation, a sense of values and a sense of the sacredness of life. In what I have said I have been invoking the older gods who preside over the world beyond medicine. I have been recalling the larger allegiances and suggesting some of the wider dimensions of medicine. In the language of the Oath, while paying homage to Æsculapius

and Hygeia and Panacea, I have urged that we swear "by Apollo".

It is the penalty of choosing a great theme that the treatment of it is bound to be inadequate. This shortcoming is especially evident on this occasion when I am using a time not especially tuned to the wave-length of Apollo. You may now with a sigh of relief return to the practical business of this gathering. We are pre-eminently engaged in a practical calling, but it has been the burden of my song to remind you that there is a great deal of the mysterious in what is practical. Most of our professional life deals with ponderables, but it is probably a useful exercise on occasion to remind ourselves of the imponderables. The words expressed four centuries before Christ still remain true. They are the words of Hippocrates and they have often been repeated.

Life is short and the Art long; the occasion fleeting; experience fallacious and judgment difficult. The physician must not only be prepared to do right himself, but also by example to make the patient, the attendants and external things co-operate.

Association Notes

THE F. N. G. STARR AWARD

The accompanying photograph was taken at a little ceremony held in the Faculty Room at McGill University on July 2, when Dr. Martin was presented with the Starr Medal. This award had been made *in absentia* at the Winnipeg meeting, as Dr. Martin's health prevented his being present there, and Dr. Walter Scriver was asked to present the medal to him in Montreal in the name of the Association.

The ceremony was the more noteworthy as being attended by five other past presidents of the Association, all from the Province of Quebec: they were Drs. J. C. Meakins; A. T. Bazin; Léon Gérin-Lajoie; D. S. Lewis; and H. B. Church. A group of friends was also present.

Dr. Scriver made the presentation in a few well chosen words and Dr. Martin responded briefly in expressing his pleasure.

The citation given by Dr. Scriver at the Annual Meeting in presenting Dr. Martin's name is as follows:

I have the honour to request that you will confer, *in absentia*, the Frederick Newton Gisborne Starr Award, upon Dr. Charles Ferdinand Martin of Montreal, fondly known to hundreds, nay thousands, of medical men in Canada and beyond her borders as "Charlie Martin".

Dr. Martin was born in Montreal in 1868 and at-

tended McGill University where he received his degrees of Bachelor of Arts, Doctor of Medicine and Master of Surgery; following graduation he was Resident Physician at the Montreal General Hospital, after which he proceeded abroad for a period of postgraduate study.

On his return in 1895 he became attached to the newly opened Royal Victoria Hospital and during the following years made an outstanding contribution to medicine as a senior clinician in the hospital and as an inspiring teacher in the faculty of Medicine at McGill. In 1923 he became its Dean and in the following year gave up his consulting practice in order to devote full time to this office, the results of which became evident in the reorganization of the preclinical departments and a great expansion of the whole medical school, in which the founding of the Montreal Neurological Institute was but one feature.

Dr. Martin received the honorary degrees of Doctor of Civil Law from Bishop's College and Doctor of Laws from Queen's, Harvard and McGill. He was one of those actively concerned in the founding of the Royal College of Physicians and Surgeons of Canada of which he was a charter Fellow.

His activities as a member of the Canadian Medical Association are too many to enumerate here, but he was one of that gallant band who were responsible for the resuscitation of the Association in the precarious years of 1920-'22 that has enabled it to grow to its present stature. In 1923 he was elected President and in 1944 to senior membership.

In addition to his noteworthy services to McGill and the Canadian Medical Association Dr. Martin played a now familiar rôle in the reorganization of the American College of Physicians, of which he is a Master, Past President, and recipient of the Stengel Award for outstanding service.

Dr. Martin has also made great contributions to the cultural life of Montreal, where, following his retirement as Dean of Medicine, he devoted his energies and enthusiasm to the development of the Museum of Fine

Arts and an increase in the educational and cultural phases of its activities, which have been reflected in the re-awakening of public interest.

While Dr. Martin is no longer actively engaged in the practice of Medicine or in public affairs, he is still greatly interested in them and his advice is still sought on

matters of this nature. It is therefore fitting, Sir, that he should receive the Frederick Newton Gisborne Starr Medal in recognition of his achievements in the fields of medical education and of organized medicine in Canada, and his contribution to the cultural life of his community.



MEDICAL SOCIETIES

CANADIAN OPHTHALMOLOGICAL SOCIETY

At the recent Sixteenth Annual Meeting of the Canadian Ophthalmological Society the following officers were elected: President—Dr. Mark Robert Marshall, Edmonton, Alta.; Vice-president—Dr. P. B. Macfarlane, Hamilton, Ont.; Secretary—Dr. R. G. C. Kelly, Toronto, Ont.; Treasurer—Dr. J. V. V. Nicholls, Montreal, Que.; Editor-in-Chief of the Transactions—Dr. Clement McCulloch, Toronto, Ont.

CANADIAN DERMATOLOGICAL ASSOCIATION

The Seventh Annual Meeting of the Canadian Dermatological Association was held at Devil's Gap Lodge, Kenora, Ontario on June 14 to 16. There were 24 members present and the following papers were read:

(1) Presidential Address—Glossodynia. Dr. W. G. Brock, Winnipeg, Manitoba. (2) Poikiloderma Congenitale—Dr. G. B. Sexton, London, Ontario. (3) The Treatment of Pollen Dermatitis with Oleoresin (Given

Orally)—Dr. B. Brachman, Regina, Saskatchewan. (4) Suppurative Ringworm.—Dr. A. R. Birt, Winnipeg, Manitoba. (5) The Value of Routine Laboratory Tests in Dermatological Office Practice.—Dr. J. R. Card, Hamilton, Ontario. (6) Considerations in the Treatment of Pigmented Nevi.—Dr. S. S. Berger, Winnipeg, Manitoba. (7) Drug Eruptions.—Dr. H. I. Goldberg, Halifax, Nova Scotia. (8) An Extensive Purpuric Eruption Caused by Sedicin.—Dr. N. M. Wrong, Toronto, Ontario. (9) The Treatment of Pustular Acne with Triple Sulphonamides.—Dr. H. G. Hurst, Winnipeg, Manitoba. (10) Atabrine in the Treatment of Chronic Discoid Lupus Erythematosus.—Dr. E. J. Trow, Jr., Toronto, Ontario. (11) Cortone in the Treatment of Pemphigus Group.—Dr. L. P. Ereaux, Montreal, Quebec. (12) An Interesting Case of Psoriasis. Dr. L. Babalian, Portland, Maine. (13) What Dermatologist Can Do For Industry.—Dr. G. E. Craig, Montreal, Quebec. (14) 25 Years of Canadian Dermatology Through the Lens of A Camera.—Dr. L. P. Ereaux, Montreal, Quebec.

On Wednesday, June 17, a clinical session was held at Deer Lodge Hospital, Winnipeg, followed by a cocktail party at the home of the President, Dr. W. G. Brock.

The following officers were elected for 1953-54: President, Dr. D. E. H. Cleveland, Vancouver, B.C.; Vice-President, Dr. D. H. Williams, Vancouver, B.C.; and Secretary, Dr. A. R. Birt, Winnipeg, Manitoba.

CORRESPONDENCE

WAR SURGERY IN KOREA

To the Editor:

I read with great interest your article by Major Al Davidson, R.C.A.M.C., in the July, 1953 issue, entitled, "Some Aspects of Present Day War Surgery".

Personnel of the 25th Canadian Field Surgical Team were attached to an American Mobile Surgical Hospital, the 8055 MASH from May, 1951 to August, 1951, as well as from October, 1951 to August 1952, as he states.

Commanding General Van Fleet commended the unit for its resourcefulness and initiative. In a letter to Brig. J. M. Rockingham, Commander of Canada's 25th Brigade, he wrote that the unit, which augmented the surgical section of the Mobile Army Surgical Hospital, 8055th Army Unit, from May to August this year (1951), came when work was unusually heavy.

"With the least possible delay this surgical unit showed resourcefulness and initiative in integrating themselves into the hospital, working tirelessly for extremely long hours in order that the wounded might receive prompt care."

He said that the officers and the enlisted men of the unit showed "the highest standard of professional ability and training and their unselfish contribution to the successful operation of the hospital as a whole was immeasurable."

"The zeal with which this unit entered into the active field operations and the tremendous constructive service which they performed on behalf of the Allied wounded and in support of the common effort in Korea reflects the highest credit on themselves and the Royal Canadian Army Medical Service and exhibits the true spirit of the United Nations forces."

42 College St.,
Kitchener, Ont.

GERARD G. LIPPERT

AGRANULOCYTOSIS IN TWO PATIENTS RECEIVING PHENYLINDANEDIONE

To the Editor:

Phenylindanedione is an anticoagulant drug possessing certain advantages over dicoumarol.¹ Two hundred and sixty-one patients have received this drug at the Toronto General Hospital, and this report concerns two of these patients in whom agranulocytosis developed.

Mrs. G.S., aged 57, following a myocardial infarct, was receiving phenylindanedione daily for twenty-eight days. The amount of drug required was not unusual and the depression of prothrombin level was satisfactory. Three days before the drug was discontinued the patient's temperature rose to 102° F. and rales were heard over the base of the left lung. A diagnosis of bronchopneumonia was made. Penicillin and streptomycin were begun and in the next two days the fever became less. The white blood cell count, which had been 11,800 per c.ml. on admission, was then found to 3,000; phenylindanedione was discontinued. During the next week the patient remained well except for slight fever with the temperature reaching 100° on several occasions. The leucocyte count continued to range around 3,000. Twelve days after stopping phenylindanedione the temperature rose to 103.8° and the white count was 1,200. On the following day she had a severe chill with a temperature of 105°. The white cell count had fallen to 900, and only lymphocytes were seen in the stained blood film. Red cells and platelets appeared normal. A marked reduction in the granulocyte series was noted in the sternal bone marrow. A culture of *B. pyocyaneus* was obtained from the blood. ACTH was given intravenously and aureomycin by mouth. During the next two days

there was no change in either the clinical condition or the leucocyte count. On the third day the temperature fell with a return of young granulocytes in the peripheral smear. The white cell count then rose to 6,000 where it remained until the patient's discharge from hospital two weeks later.

Mrs. H.M., aged 64, received treatment for phlebitis following a Judet arthroplasty of the left hip. The signs of phlebitis slowly decreased and, after 21 days of treatment, phenylindanedione was discontinued. One week later an exacerbation of phlebitis occurred and the drug was given again. After four days the patient became drowsy and complained of a severe headache. The temperature was 101.4° F., and several papules appeared over the buttocks which were itchy at first and later became painful. The leucocyte count was found to be 600, and phenylindanedione was discontinued. Rare eosinophils were the only granulocytes seen in the smear. Before operation the count had been 6,900. The platelets and red cells were normal. ACTH, cortisone, blood transfusions, penicillin and streptomycin were given without avail, and the patient died six days later. The lesions of the buttock became necrotic followed by widespread necrosis of skin and subcutaneous tissues of the back. In addition to phenylindanedione this patient had received aureomycin, 500 mgm. daily for five days, followed by terramycin, 500 mgm. daily for a week. This latter drug was stopped one week before the onset of agranulocytosis.

It cannot be said with certainty that agranulocytosis was due to phenylindanedione administration in these two patients. A search of the literature did not disclose another instance of this complication occurring during or following phenylindanedione therapy. Nevertheless, any new drug must be regarded with suspicion in such circumstances and, if this is an important complication, further reports will soon appear.

R. L. MacMillan, M.D.,
K. W. G. Brown, M.D.

Department of Medicine, University
of Toronto, and the Medical Service,
Toronto General Hospital.

REFERENCE

1. BROWN, K. W. G. AND MACMILLAN, R. L.: The anticoagulant effect of phenylindanedione in thromboembolic disorders, *Am. J. M. Sc.*, 225: 495, 1953.

SPECIAL CORRESPONDENCE

The London Letter

(From our own correspondent)

PRESCRIBING PRESCRIPTIONS

In June, 1950, the Joint Committee on Prescribing of the Central and Scottish Health Services Councils classified proprietary preparations under six categories: (1) New drugs of proved value not yet standard. (2) Proprietary brands of standard drugs, singly or in combination. (3) Standard preparations, and new remedies of proved value, in elegant form or vehicle. (4) Qualitative and/or quantitative modifications in the composition or combination of standard preparations, or new remedies of proved value, which are not accepted as therapeutically superior to preparations included either alone or in combination in the British Pharmacopoeia, the British Pharmaceutical Codex or the National Formulary. (5) Preparations not in the British Pharmacopoeia, British Pharmaceutical Codex or National Formulary, which in the Committee's views have not been proved of therapeutic value. (6) Preparations which are a combination of (4) and (5).

The committee recommended that proprietary preparations in category (1) should be freely prescribable and

that those in categories (2), (3), and (4) should be prescribable provided satisfactory pricing arrangements were made between the Health Departments and the manufacturers and provided they were not advertised to the public. The remaining categories were dealt with in a more circumlocutory manner: "Apart from preparations in categories (5) and (6) . . . we have no reason for suggesting on medical grounds that these proprietary preparations should not be freely prescribable in the National Health Service except when advertised direct to the public".

The committee next proceeded to classify proprietary preparations into their categories, and the result of 2½ years' work has now been published and sent to every doctor serving under the National Health Service. During this time 5,000 preparations have been reviewed, and 800 of these are included in the published classification: 150 fall in category (1), and 650 in categories (5) and (6). Of the remaining 4,200 it is stated that "it may be assumed that they fall into categories (2), (3) and (4)". In a covering letter, the Chief Medical Officer to the Ministry of Health asks doctors not to prescribe preparations in categories (5) and (6), and "only to prescribe preparations not included in the enclosed lists after you have ascertained the cost and compared it with that of identical or similar standard preparations and not to prescribe preparations of which the price is not readily and conveniently ascertainable". He adds: "Obviously what I have said is without prejudice to your right to prescribe whatever you think necessary in any individual case but a general practitioner may, of course, be called on to justify the cost of his prescribing to his colleagues on the Local Medical Committee".

Whilst any interference of action is anathema to a liberal profession, it must be admitted that the preparations listed in categories (5) and (6) are little loss to the profession or their patients. They consist largely of polyglandular preparations, enzyme preparations such as pepsin and diastase, oral vaccines, adrenaline cream and chlorophyll tablets. As the *Pharmaceutical Journal* points out in reference to the polyglandular products, "A clean sweep was made by the 1949 Codex of these out-of-date products and if manufacturers had taken heed of the warning so clearly given then they would have avoided the action now taken by the Ministry".

CLINICAL RESEARCH

A recently published White Paper on "Clinical research in relation to the National Health Service" consists of a report drawn up by a joint committee of the Medical Research Council and the Ministry of Health. It is "concerned primarily with those deficiencies in the provision for medical research which have become evident as experience of the working of the National Health Service Act has increased". Its major recommendation is the setting up of a Clinical Research Board by the Medical Research Council, to act as "a central organization for the promotion of clinical research". This new Board is to work in close liaison with the Health Departments and the clinical departments of the universities. In addition, it is recommended that provision should be made for decentralized research at the level of regional hospital boards and hospital management committees. It is strongly urged that "careers in clinical research should be equated with careers in the National Health Service. They should confer the same status, carry the same salary and superannuation rights, and entitle the holder to the same distinction awards". In 1952-53 the Medical Research Council's approved expenditure on clinical research was £431,500. The White Paper estimates that the additional expenditure necessary to develop this new scheme will be in the region of £50,000 in the first year, rising to £250,000 in three or four years.

Perhaps it is the spate of white papers, blue prints and paper plans for a Brighter Britain, with which we have been inundated since 1945, which is making us blasé, but this announcement of the proposed production of yet another "Board" has aroused little enthusiasm.

"Clinical research", in the strict sense of the term, has always tended to be the Cinderella of the Medical Research Council. If this White Paper, which, incidentally, has been accepted in principle by the appropriate Ministers, is carried into effect and so stimulates genuine clinical research—and not only in the rarefied atmosphere of teaching hospitals—then nothing but good can come of it.

WILLIAM A. R. THOMSON

London, August, 1953.

OBITUARIES

DR. A. H. BAKER died of coronary thrombosis on July 31, in Shaughnessy Hospital, Vancouver. Dr. Baker was widely known throughout Canada for his work in the field of tuberculosis, and will be especially missed in the Province of Alberta, where he directed the fight against this disease for thirty-two years.

Born in Walkerton, Ontario, Dr. Baker received his early education in Ontario and Quebec, later receiving his B.A. degree from McMaster University and his M.B. in 1911 from the University of Toronto. In 1914 he went to the Mayo Clinic for postgraduate training. A year later, he developed tuberculosis and went for treatment to Trudeau Sanatorium. Following his discharge from Sanatorium, he worked for six months in the Sanatorium at Otisville, N.Y., before coming to Alberta, where he spent some time in general practice before joining the Canadian Army Medical Corps. After his discharge from the Army in 1918, he was appointed Medical Superintendent of the Veterans' Sanatorium at Frank, Alberta. When the Central Alberta Sanatorium was opened in Calgary in 1920, Dr. Baker became Superintendent and remained in that position till his retirement in 1950. From 1936 till his retirement, he had the added duties of Director of the Division of Tuberculosis Control in the Provincial Department of Health. Following his retirement, he took up a new position as consultant and director of treatment to the Department of Indian Affairs Sanatorium at Nanaimo, B.C., and was active there till his last illness.

Dr. Baker was a Fellow of the American College of Chest Physicians, a Fellow of the Royal College of Physicians of Canada, a member and past president of the Canadian Tuberculosis Association and of the Calgary Medical Society, a member of the Canadian Medical Association, one of the founders and for many years a director of the Alberta Tuberculosis Association, and a former member of the Calgary Rotary Club. He was on the consultant staff of the Calgary General Hospital and the Colonel Belcher Hospital. Surviving is his son, Dr. Perren E. Baker, Edmonton.

DR. MAURICE BONNIER, of Montreal died on July 4 at the Hotel Dieu after a long illness. He was 44. A native of Montreal he graduated from St. Mary's College and obtained his medical degree from University of Montreal in 1934. Dr. Bonnier did postgraduate work at Philadelphia and Paris before taking charge of the bronchoscopic services at Ste. Justine and Sacred Heart Hospitals here. He was also a specialist consultant at the Hotel Dieu and taught his specialty at the University of Montreal.

Dr. Bonnier was a member of the American College of Chest Physicians and a founding member of the International Broncho-Esophagological Society. He is survived by his widow, three sons and two daughters.

DR. EDWARD C. BROOKS, of Montreal, died on June 28 following a short illness. He was 63. Born in Karachi, Pakistan, where his father was Civil Surgeon with the British Government, Dr. Brooks received his medical education at the University of Edinburgh where, in 1914, he obtained his L.R.C.P. & S., Edinburgh, and his L.F.P. & S., Glasgow.

He entered the R.A.M.C. and served during the First

World War with the Indian Medical Corps as medical officer in the Mesopotamian Yemen, and Northwest Indian theatres until 1920, rising to the rank of acting lieutenant-colonel. Upon demobilization, he came to Canada and set up residence with his family in Edmonton, Alta.

In 1922, Dr. Brooks became an assistant to the late Dr. A. H. Pirie, of the Department of Radiology of the Royal Victoria Hospital. Appointed clinical assistant with the attending staff in 1923, he was named assistant radiologist in 1927 and radiologist in 1935. From 1935 to 1938, he was acting radiologist-in-chief. His long career was marked by his outstanding ability as a teacher in his medical specialty. He is survived by his widow and four children.

DR. CHRISTOPHER ADDISON CAMPBELL, aged 79, died at his Kirkton, Ont. home on July 12. Born in Toronto, he graduated in medicine from the University of Toronto in 1900. He studied in England for two years, was a ship's surgeon for two years and practised in Sudbury for a year. He came to Kirkton in 1905 where he had been a general physician for 45 years. He was a past president of the Kirkton Horticultural Society and of the Kirkton Community Association. Surviving is his widow.

DR. HARRY ARTHUR CATES, aged 63, director of the school of physical and health education, University of Toronto, died on July 1. Born in England, Dr. Cates came to Canada in 1908 and graduated in medicine from U. of T. He was promoted to lieutenant in World War I in the Canadian Army Medical Corps. He later became a captain in the R.M.C. Dr. Cates returned to the university after the war and was professor of anatomy when he was appointed director of the physical and health education school in 1949. He was the author of several books, including Primary Anatomy, and a member of the Academy of Medicine and the council of the Royal Canadian Institute from 1943 to 1947. He is survived by his widow and two sons.

DR. CHARLES H. ELLIOTT of Kingston, Ont., died recently. Dr. Elliott attended Kingston Collegiate Institute and later graduated from Queen's Medical College. He joined the Canadian armed forces during World War I and served until the conclusion of hostilities as medical officer. In 1919 he opened a medical practice in Kingston. The late Dr. Elliott was known for his skill as a surgeon; he was kind and patient, friend as well as physician.

DR. ELMOR TILLEY KENNEDY died in the Sussex Hospital on July 15, aged sixty-nine years. He was born at Young's Cove, New Brunswick; attended the University of New Brunswick and received his medical degree from the Chicago College of Medicine and Surgeons in 1913; practised a short time in Chicago and then for a period at Young's Cove. He then joined the C.A.M.C. in 1918 and served until the end of the First World War. Between the two World Wars he was medical officer to the New Brunswick Rangers. In 1939 he again served on the active list at various posts until invalidated out with the rank of Major. He was an interested member of the Canadian Legion and was a member of Corinthian Lodge of Free and Accepted Masons. In community life, he was a member of the Sussex Council and served two terms as Mayor of Sussex. He was a life-long Conservative and served as M.L.A. for Kings from 1939 to the time of his death, when he was Speaker of the House. The cold facts of his career do not give a picture of the man who as physician, rural surgeon, politician, fraternity member, soldier and long-time resident of Kings County knew intimately a large number of people of varied interests. In his busy life, his contacts were many and they were all of great interest to him and it is a tribute to his character and personality that he is sincerely mourned by so many in his native Province and elsewhere. His death brought forth sincere eulogies from both political parties, as well as from friends in all walks of life. He is survived by his wife and one daughter.

DR. CARMAN REYNOLDS McKISHNIE, who practised medicine in Dutton, Ont., for the last 25 years, died suddenly of a heart attack on July 10. He was 51. Dr. McKishnie was born in Aldborough Township, Elgin County, and graduated from the University of Western Ontario School of Medicine in 1928. He came here immediately after graduation and became a highly-esteemed member of the community. He was a member of the West Elgin Medical Association. His widow survives with one son, John McKishnie Jr., who is attending medical school at the University of Western Ontario.

DR. E. J. NELSON, who practised in Acton, Ont. for 20 years, died suddenly on June 10 at Pomona, Calif. He was in his 56th year. Following his graduation from the University of Toronto in 1920, Dr. Nelson started his practise in Acton. He built up a large practise and took an active and keen interest in the town. He was a member of council for several years; was active in sport and was manager of the hockey teams of those years he spent here. He was also active in the United Church and was an accomplished organist. He often presided at the organ in the church services. In 1941 he moved to Guelph and later practised in Collingwood, Chatham and Pomona, California. He leaves his widow, two daughters and one son.

DR. HERBERT J. SULLIVAN, former chief of staff at St. Joseph's Hospital, Hamilton, Ont. and a practising physician in Hamilton for the past 45 years died suddenly on July 9. He was born in Peterborough, but lived in Hamilton most of his life. Dr. Sullivan graduated from Queen's University in 1907. He was a member of the Hamilton Academy of Medicine, the O.M.A. and the C.M.A.

DR. DAVID G. WILSON, aged 59, former medical director of St. Mary's-on-the-Lake Sanatorium, Haileybury, died on July 19 at the Toronto General Hospital. He suffered a heart attack in 1947 and had been a resident of Toronto since his retirement in 1948. Dr. Wilson was born at Gananoque and graduated in medicine in 1920 from the University of Toronto. He interrupted his medical course to enlist in the First World War and served overseas with the First Brigade, Canadian Field Artillery. From 1920 to 1927 he was on the staff of Mountain Sanatorium, Hamilton, and until his appointment as medical director of the Haileybury Sanatorium in 1932, he was with the Travelling Clinic, Provincial Department of Health.

Dr. Wilson was a past president of Temiskaming Medical Society and was a member of the Canadian, Ontario and British Medical Associations. He leaves his widow, a daughter and a son.

ABSTRACTS from current literature

MEDICINE

A Comparison of the Effect of Vitamin B₁₂ with that of Liver Extract in the Treatment of Pernicious Anæmia during Relapse and for Maintenance.

MURPHY, W. P. AND HOWARD, I.: NEW ENGLAND J. MED., 247: 838, 1952.

Careful study of two groups of patients with pernicious anæmia in relapse showed equally satisfactory therapeutic results in the one group (eight cases) with injections of vitamin B₁₂ as were obtained in the second group (25 patients) treated with injections of liver extract, although return to normal blood levels was perhaps somewhat faster with the use of liver. Maintenance therapy was satisfactorily carried out in the first group

with continuance of administration of parenteral vitamin B₁₂.

The authors are of the opinion that pernicious anaemia can be equally well treated with either liver extract or vitamin B₁₂.
NORMAN S. SKINNER

Urinary-Tract Infections in Diabetic Women.

BARNARD, D. M., STORY, R. D. AND ROOT, H. F.: NEW ENGLAND J. MED., 248: 136, 1953.

Urinary-tract infections are a serious problem among diabetics. Thirty per cent of 100 autopsies at the New England Deaconess Hospital 1945-50 revealed the presence of a significant urinary infection. A special follow-up clinic was organized for the treatment of such urinary infections among diabetics and of the first 52 patients all but one were female. Only five were cured and twenty-nine improved by intensive use of antibiotics.

The authors stress the importance of teaching proper methods of rectal hygiene to female diabetic patients. Contamination of vulva and urethral orifice with organisms from the colon must be avoided by cleansing toward the anus and not toward the vagina. All catheterizations should be performed with good visualization and best possible aseptic conditions. For female patients two nurses are required, one to spread the labia while the other inserts the catheter and the patient must be on a high examining table with stirrups. Whenever a retention catheter is necessary or whenever any surgical procedure is carried out on the urinary tract prophylactic chemotherapy with penicillin, streptomycin or Cantrisin should be employed. Prompt correction of any obstructive condition should be carried out, although they are usually not discovered until after urinary infection has developed.
NORMAN S. SKINNER

SURGERY

Colles's Fracture.

MASON, M. L.: BRIT. J. SURG., 40: 340, 1953.

Colles's fracture is twice as common as any other fracture about the wrist and constitutes one-eighth of the fracture material coming for treatment at an accident department. It is treated by house officers who reduce it and apply a plaster and follow-up is chiefly concerned with maintaining finger, elbow and shoulder movement.

In a study of the end-results of 100 cases, only 5 failed to regain full function. One developed Sudeck's atrophy and 4 had a preventable disability. A poor cosmetic result was obtained in 26 cases, in that the dinner-fork deformity recurred in plaster in spite of good primary reduction. But this dorsal angulation of the radial fragment is unimportant and is compatible with full function.

Poor functional result is due to interference with the distal radio-ulnar joint when the radial deviation of the distal radial fragment is uncorrected. In such cases the fibrocartilage cannot heal. It is therefore more important to immobilize the wrist in full ulnar deviation, than to maintain palmar flexion. It is considered that the poor cosmetic result due to recurrence of the dorsal tilt in plaster is unavoidable but does not prevent full function.
BURNS PLEWES

The Burnt Foot.

LONDON, P. S.: BRIT. J. SURG., 40: 19, 1953.

In a description of 301 burnt feet from the Birmingham Accident Hospital several principles of treatment are advocated. Of the 247 patients, 21 were suffering from shock due to extensive burns and 5 died.

Immediate split-skin grafting within a few hours of burning is strongly recommended. The extent of full thickness skin loss is best diagnosed by the pin-prick test. The open treatment of burns is not used. Every precaution must be taken to prevent infection and

cedema. The most common cause of failure of primary grafting was bleeding under the graft. Many industrial burns were small and deep, due to molten metal, and these do particularly well with immediate excision and grafting. Much time and function is saved. Split grafts are usually permanently adequate even on weight-bearing surface and over tendon (if paratenon remains) and bone. Penicillin cream applications before grafting and postoperatively tulle gras and penicillin spray were used. Postoperative *Ps. pyocyanea* and coliform bacilli were found to delay healing and were controlled by polymyxin.

Storage of split skin at 2 to 4° C. permitted the application of skin to small areas of ulceration up to four weeks after the primary grafting. Only 4 of the 242 surviving patients failed to make at least satisfactory recoveries under this type of treatment. BURNS PLEWES

PÆDIATRICS

The Part of the Technique of Feeding in the Etiology of the Diseases of the Young Infant.

GOTTSCALK, E.: J. PEDIAT., 42: 54, 1953.

The author is a trained paediatrician who is a private nurse to young infants and notes many things generally concealed from the paediatrician. She draws attention to the weakness of the newborn infant and its inability to make its wants known. Time schedules should not be rigidly followed and the baby should be fed slowly in order to allow a full feeding. If the infant takes the breast too lustily there will be air-swallowing which will cause vomiting or projectile vomiting. If an infant is tired while at the breast, it should be allowed to sleep for five minutes and then to nurse again. Both the mother and infant should lie on their sides, facing each other, for nursing as this is the more natural position for both. In the majority of cases, by observing all the requirements and studying the infants thoroughly one succeeds in reducing the frequency of vomiting to such a degree that it assumes the character of an occasional incident. The main symptom of pylorospasm, the violent projectile vomiting, is a proof that the stomach is highly filled with air. Also the deep peristaltic waves which are usually visible in the epigastrium of infants suffering from pylorospasm demonstrate that a great amount of air is in the stomach. Otherwise the waves would not occur.

Taking care of young infants is a very interesting matter for the paediatrician. It affords important observations concerning the normal and pathological physiology of young infants. The technique of feeding is of a higher importance than is generally supposed, and it appears to have a great part in the etiology of several diseases of the young infant.
J. A. STEWART DORRANCE

Reduction of Mortality in the Premature Nursery: II. Incidence and Causes of Prematurity: Ethnic, Socio-economic, and Obstetric Factors.

BLOCH, H., LIPPSETT, H., REDNER, B. AND HIRSCHL, D.: J. PEDIAT., 41: 300, 1952.

Of the 3 maternal conditions selected for investigation, the socio-economic status of the pregnant mother was found to be a major influence in determining maturity of her newborn infant. A significant increase in the incidence of prematurity was found in ward patients as compared with private patients. Ethnic origin played no part in determining newborn maturity, while socio-economic factors affected white and Negro mothers alike. Maternal illness played a negligible part on the incidence of prematurity; its influence was felt most likely on the condition of maternal nutrition. Obstetric conditions were linked with 32% of premature births. Of 960 premature births, 16% were associated with induced therapeutic premature delivery because of toxæmia, placenta prævia, premature separation of placenta, repeat Cæsarean section, and a rising Rh titre; 16% were associated with

multiple pregnancies and breech presentation; and 68% occurred spontaneously without any evident maternal or obstetrical condition. The occurrence of premature birth is primarily a public health problem concerned basically with socio-economic status and nutritional condition of the pregnant mother. Inadequately prepared for the nourishment of the fetus, the pregnant mother often delivers prematurely. J. A. STEWART DORRANCE

Studies of the Immunology of the Newborn Infant: I. Age and Antibody Production.

OSBORN, J. J., DANCIS, J. AND JULIA, J. F.: *PEDIATRICS*, 7: 736, 1952.

Forty infants, 1 week to 6 months of age, who had no circulating antitoxin were immunized with 1 injection of a high titre diphtheria toxoid on alum and their antitoxin responses were followed at regular intervals up to 6 months afterwards. The ability to form antitoxin improved during the first 2 months of life. No significant differences could be demonstrated between the response of infants 2 to 4 months of age and that of infants 6 months of age. Twenty-seven of these infants were immunized at the same time in the contralateral arm with a single dose of tetanus toxoid on alum. The response to tetanus immunization was faster and better in infants from 2 to 6 months of age than in infants 1 month of age, and younger. The response to tetanus toxoid preparations was faster and better than the response to the diphtheria toxoid preparation. In conclusion it may be said that the infant can form antibodies from birth. The ability to form antibodies improves during early life. For diphtheria and tetanus antitoxin, the improvement is rapid during the first 2 months and then is much slower. The advisability of early immunization is related to the potency of the antigen to be used.

J. A. STEWART DORRANCE

Health of Premature Children from Birth to Four Years.

DOUGLAS, J. W. B. AND MOGFORD, C.: *BRIT. M. J.*, 4813: 748, 1953.

Forty thousand prematures are born yearly in Great Britain (birth weight $5\frac{1}{2}$ lbs. or less). It is a well-established fact that 25% of these die before they are a month old. However, medical and nursing science succeed in saving more of them each year. Since claims have been made that the survivors are sickly, stunted, or mentally retarded, the authors feel it a good plan to check on such claims in order to determine what to expect in the way of handicaps.

Results of the study are cheering, and the authors indicate that saving the premature is an important paediatric "must". They also show by carefully analyzed statistics that poor health is not usually the lot of the premature after the first two years. The sample, taken in 1946, included 676 children born in one week. Of these 543 survived at one month. After $4\frac{1}{2}$ years the original group had dropped to a total of 464. These had been carefully paired with normal babies of the same sociological background, born on the same day, and, as often as possible, having the same place in the family.

Conclusions of the study are that (1) the high mortality extends beyond the first month, and between the ages of one month to four years. Deaths are largely due to congenital defects and lower respiratory infections. (2) During the first two years prematures show a higher incidence of hospital admissions most of which are due to bronchitis and pneumonia. After this he is no more likely to require hospitalization than the normal child. (3) Respiratory infections, both upper and lower, is the most common ailment of the premature under two. This greater susceptibility appears even among prematures reared in a favourable home environment.

There is no reason, according to this study, why the surviving premature should not lead a healthy normal existence after he is safely through his first two years.

ISABEL M. LAUDER

THERAPEUTICS

The Method of Administering Dicoumarol.

BJERKELUND, C. J.: *LANCET*, 1: 6: 260, 1953.

The incidence of hæmorrhage in some of the published series has been so great that dicoumarol has been discredited as dangerous. Hæmorrhage has usually been observed in 5 or 6% of hospital patients; some of these cases have been fatal. In the prolonged treatment of out-patients the incidence of hæmorrhage has been still greater—up to 15%. One reason why hæmorrhage occurs so often is that there is considerable disagreement about the requisite dosage. In the author's opinion, it is a good rule to make patients aware of the danger of hæmorrhage, and to advise them to report to their physician immediately if they observe hæmaturia, epistaxis, blood in the stools, or ecchymoses in the skin and mucosæ without trauma.

In 522 patients treated at the Oslo Municipal Hospital there was not a single serious hæmorrhage. Slight hæmorrhages, such as hæmaturia, epistaxis, bleeding hæmorrhoids and streaks of blood in the sputum, all of short duration, were seen in eight patients. Continuous administration is more desirable than intermittent dosage. Exact and dependable prothrombin estimations are essential; Owren's method is especially recommended. The effect of dicoumarol appears slowly, lasts long, and varies greatly from one patient to another. The same initial dose of 250 mgm. on the first day, and 125 mgm. on the second day, may be used in all cases. The effect of the initial dose is seen after two or three days and gives the first indication of the patient's tolerance. Thereafter, the dosage should be adjusted according to the shape of the curve of prothrombin values, and not to the current prothrombin value. Large variations in the dosage from day to day should be avoided as much as possible while one is trying to reach the correct maintenance dose. When the patient feels nauseated and vomits before receiving treatment, as may be the case in coronary thrombosis, it is advisable not to administer the whole initial dose at once, but to give it in smaller portions during the day.

Close contact between laboratory, physician and patient is essential. Dicoumarol dosage should be adjusted immediately even to minor fluctuations; an increase or decrease equalling two to four milligrams a day, is often enough to provoke a distinct fall or rise in the prothrombin curve after eight to fourteen days.

In cases where an immediate anticoagulant effect is desirable, heparin should be administered with dicoumarol until the prothrombin value has reached the therapeutic range. B. L. FRANK

Fatality Due to Agranulocytosis Following Use of Phenylbutazone (Butazolidin).

ETESS, A. D. AND JACOBSON, A. S.: *J. A. M. A.*, 151: 639, 1953.

Although cases of agranulocytosis had been reported previously, this appears to be the first published* case of agranulocytosis with a fatal outcome.

A 74-year old white male with progressive rheumatoid arthritis of 33 years' duration was treated with 200 mgm. of phenylbutazone three times a day for several days. The dose was then reduced to 400 mgm. per day; there was no improvement and the initial dose of 600 mgm. was re-started and maintained. After seven days of therapy, there was marked relief of pain and complete reduction in redness in the acutely involved joints. Physiotherapy was instituted and was the only concomitant therapy.

*Two deaths following the use of Butazolidin were reported in the *British Medical Journal* (Dec. 27, 1952, p. 1427) and one in the *Lancet* (Jan. 24, 1953, p. 192).

Initially, complete blood studies were performed three times a week and after one month of therapy were done once a week. There was a 2 gram fall in hæmoglobin level during the first two weeks of therapy. After seven weeks of therapy, the hæmatological status had remained unchanged except for the initial fall in hæmoglobin. At the beginning of the eighth week of treatment, the white blood cell count fell to 700 cells. The platelets, red blood cells and hæmoglobin were unchanged. A sternal marrow aspiration confirmed the selective depression of myeloid elements. Phenylbutazone was discontinued, and large amounts of penicillin and aureomycin were administered. Despite this prophylactic therapy, a fever of 103° and physical signs of a right middle lobe pneumonitis developed three days following the onset of aganulocytosis. Later on that day, the patient died.

B. L. FRANK

Oral Undecylinic Acid in the Prevention of the So-called Monilial Complications Secondary to the Use of Aureomycin, Chloramphenicol and Terramycin.

MOUNTAIN, D. C. AND KRUMENACHER, F. P.:
AM. J. M. SC., 225: 3: 274, 1953.

The use of the so-called wide-spectrum antibiotics may be attended, or followed, by nausea and diarrhoea, glossitis, pharyngitis, pruritus ani, pruritus vulvæ, vaginitis, and also in some cases by proctitis and colitis. Considering monilia as the probable cause of these complications, the authors tried undecylinic acid by mouth, since its local application as a fungicidal agent is well established and its low toxicity known, even when used in large doses orally as in the treatment of psoriasis.

One to three capsules (0.44 to 1.32 gm.) were given with each dose of the antibiotic, three times a day after meals; this dosage is only a small fraction of that used in psoriasis. The criterion in the selection of patients was that they received at least 1 gm. of aureomycin, chloramphenicol or terramycin daily for five or more consecutive days. Twenty patients were given one of the broad-spectrum antibiotics and undecylinic acid simultaneously; none of them developed pharyngitis, glossitis, pruritus ani, pruritus vulvæ, or proctitis. Forty-two patients received undecylinic acid three days after the antibiotic had been started; two of them developed pruritus ani (3.2%). As controls served the subsequent forty-five cases admitted to the hospital, to whom antibiotics were again given in a dosage of 1 gm. for five or more days. Twelve of these 45 control cases developed one or more of the above-mentioned side effects, (26.7%).

In view of these results, the use of undecylinic acid should be considered whenever oral aureomycin, chloramphenicol or terramycin are administered. It is suggested that one capsule (0.44 gm.) of the drug be given simultaneously with each 250 mgm. of the antibiotic.

B. L. FRANK

GYNÆCOLOGY AND OBSTETRICS

Spinal Headache.

LEIGHTON, H. T. AND HERSHENSON, B. B.:
OBST. AND GYNÆC., 1: 426, 1953.

This paper reports on 404 closely followed patients in whom spinal anaesthesia was used for vaginal delivery. The incidence of "spinal" headache in the untreated cases following spinal anaesthesia was 26%.

A method of reducing the incidence of "spinal" headache is presented. With the application of the spinal belt alone, the incidence of "spinal" headache was 3.4%. The causes of "spinal" headache are discussed. A theory is presented as to the probable cause of "spinal" headache.

The research for a simple medication by mouth to prevent "spinal" headache is not ended.

ROSS MITCHELL

RADIOLOGY

Double-Contrast Examination of the Colon with Special Emphasis on Studies of the Sigmoid.

MORETON, R. D.: RADIOLOGY, 60: 510, 1953.

The x-ray diagnosis of lesions of the colon has been receiving a great deal of attention in the last few years. Pathology in the rectum cannot be diagnosed with x-ray and the necessity for digital and proctosigmoidoscopic examination in all patients with rectal bleeding is again emphasized. The anatomy of the rectum and sigmoid is reviewed and it is noted that 70.5% of carcinomas of the colon are in the rectum and sigmoid: 71.2% of all large bowel polyps are in the rectum and sigmoid: 60% of all carcinomas of the colon occur within 25 cm. of the anus. Following a contrast air and barium enema and the taking of the usual films, the patient is placed with legs hanging over the edge of the table in a "sitting position". The greater trochanters are lined up in the centre of the table and with the feet on a stool for security the patient bends as far forward as possible and the central ray is directed through the spine and sacrum. This allows for a very good demonstration of the sigmoid. A number of illustrative radiographs showing polyps, diverticulæ and carcinomata, are included.

CHARLES E. VAUGHAN

INDUSTRIAL MEDICINE

Management of the Neuroses in Industrial Medicine.

FEIGIN, S.: NEW YORK STATE J. MED., 51:
No. 19, 2228, 1951.

In the teaching of psychiatry medical schools have for over twenty-five years stressed the rôle of mental development as the primary factor in the etiology of the neuroses. Attention has been drawn also to the importance of the early application of a psychotherapeutic approach. Moreover this subject has been featured in nonpsychiatric publications. On the other hand, in the practice of industrial medicine, the therapy of the neuroses is dominated still by symptomatic treatment.

The author of this article urges the early recognition and application of psychodynamic factors to the problems of subjective symptomatology. He outlines the rôle of the neuropsychiatrist in present-day industrial medicine and indicates its inherent weaknesses: (1) the late appearance on the scene of the neuropsychiatrist and the resultant suspicion, hostility and skepticism on the part of the patient. (2) The fact that the patient in industrial medicine is usually handled in a clinic atmosphere, whereas in handling neurotic tendencies, the individual consideration is important. (3) The uncritical treatment usually instituted for the amelioration of physical complaints; no doubt is thrown on an original diagnosis or evaluation until everybody's patience is worn out or some crisis is precipitated.

It must be remembered that the neurotic has a great tendency to blame, load or funnel his inner problems on to any convenient external manifestation; also the specific effect of symptomatic treatment in nurturing, prolonging, enlarging and fixating neurotic tendencies is not generally understood. The author urges a reevaluation of the whole problem. He would include a brief survey of the life experiences and life situation of the individual in the initial physical examinations. This important educational step could be greatly facilitated by the attending physician and the neuropsychiatric consultant examining the patient together. Frequently, under the prevailing practice the examination by the neuropsychiatrist only accentuates the problem. Furthermore it is his contention that any meagerness of objective physical findings, dis-

ability out of proportion to the findings, or imperviousness to physical and medicinal therapy, should be recognized early and the frank psychotherapeutic approach instituted immediately.

MARGARET H. WILTON

The Problems of Lumbar Intervertebral Disc Injuries and their Importance in Industry.

DAVIES, F. L.: BRIT. J. INDUST. MED., 2: 84, 1952.

Lumbar intervertebral disc injuries have been much to the fore in the last ten years; their occurrence in industry is a real problem. That rupture of the intervertebral disc is the most common cause of sciatica is now generally recognized. The conservative treatment, however, and the attitude to the results are not as well established. In this article the author gives a brief review of the subject in order to help in the understanding of the problems involved. He maintains that the medical profession should be aware of the fact that much needs to be done in the conservative treatment of this condition.

The treatment is not simple. The author presents information regarding conservative, operative and post-operative treatment as practised at the present time, together with opinions of several authorities. He then gives results as reported by various authors. The records of the London Area, London Midland Region, British Railways, gave interesting data regarding 61 cases suffering from prolapsed lumbar intervertebral discs. Of these, 43 cases had been treated conservatively and 18 by operation. The percentage back at full work of those undergoing operative treatment was 61%; of those undergoing conservative treatment 30.2%. Although this series of cases was too small to be of statistical value, the results give a very approximate idea of the type of result seen by the industrial medical officer, especially by those engaged in railway work.

The author stresses the need for earlier active treatment of these cases; this can be achieved only by earlier diagnosis and investigation. It is his opinion that the results of operative treatment while not successful in all cases, at least demand a careful and earlier selection of those cases not likely to benefit from prolonged conservative treatment. He indicates also the need for an appreciation by doctors treating these cases that as far as industry is concerned a *good* result means that the employee is back at his pre-accident work in the least possible time.

MARGARET H. WILTON

FORTHCOMING MEETINGS

CANADA

INTERNATIONAL PHYSIOLOGICAL CONGRESS, 19th Congress, Montreal, Canada (Miss MacCallum, Donner Bldg., McGill University, Montreal), September 1-5, 1953.

INTERNATIONAL CONFERENCE ON ALCOHOL AND ROAD TRAFFIC, Second Conference, Hart House, University of Toronto, Toronto, Ontario. (H. David Archibald, Secretary, 9 Bedford Road, Toronto 5) September 9-12, 1953.

BRITISH COLUMBIA DIVISION, C.M.A., Annual Meeting, Vancouver, B.C. (Dr. G. Gordon Ferguson, Exec. Secretary, 1807 West 10th Ave., Vancouver, B.C.) September 21-25, 1953.

CANADIAN PUBLIC HEALTH ASSOCIATION, 41st Annual Meeting, Royal York Hotel, Toronto. (C.P.H.A., 150 College St., Toronto 5) October 1-2, 1953.

INTERNATIONAL ANÆSTHESIA RESEARCH SOCIETY, 28th Annual Congress, Chateau Frontenac, Quebec, P.Q. (Dr. A. William Friend, Chm. Program Committee, 515 Nome Avenue, Akron, Ohio) October 26-29, 1953.

CANADIAN ASSOCIATION OF OCCUPATIONAL THERAPY, Annual Convention, Royal York Hotel, Toronto (Miss Isobelle Jaeger, 331 Bloor St. West, Toronto 5) October 31-November 2, 1953.

UNITED STATES

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION, 31st Annual Scientific and Clinical Session, The Palmer House, Chicago, Ill. (Executive Offices, 30 North Michigan Ave., Chicago 2) August 31-September 4, 1953.

AMERICAN MEDICAL WRITERS' ASSOCIATION, 10th Annual Meeting, Springfield, Ill. (Dr. Harold Swanberg, Secretary, 209-224 W. C. U. Bldg., Quincy, Ill.) September 23, 1953.

NATIONAL GASTROENTEROLOGICAL ASSOCIATION, 18th Annual Convention, Los Angeles, Calif. (Dr. Samuel Weiss, 146 Central Park West, New York 23, N.Y.) October 12-14, 1953.

AMERICAN PUBLIC HEALTH ASSOCIATION, 81st Annual Meeting, New York, N.Y. (A.P.H.A., 1790 Broadway, New York 19) November 9-13, 1953.

AMERICAN MEDICAL ASSOCIATION, Clinical Session, St. Louis, (Dr. George F. Lull, 535 N. Dearborn St., Chicago 10, Ill.) December 1-4, 1953.

OTHER COUNTRIES

INTERNATIONAL CONGRESS OF TROPICAL MEDICINE AND MALARIA, Istanbul, Turkey (Prof. Dr. Ihsan Sükrü Aksel, General Secretary, Tunel Meydan, Beyoglu, Istanbul, Turkey) August 28-September 4, 1953.

WORLD MEDICAL ASSOCIATION, 7th General Assembly, The Hague, Amsterdam, Holland (Dr. Louis H. Bauer, Secretary-General, 2 East 103rd St., New York 29, N.Y.) August 31-September 6, 1953.

INTERNATIONAL CONGRESS OF MICROBIOLOGY, 6th Congress, Rome, Italy (Dr. N. E. Gibbons, Secretary, Canadian Society of Microbiology, Division of Applied Biology, National Research Council, Ottawa 2, Ont.) September 6-12, 1953.

WORLD CONFEDERATION FOR PHYSICAL THERAPY, 1st Congress, London, England (Miss M. J. Neilson, Secretary, Chartered Society of Physiotherapy, Tavistock House, South Tavistock Square, London W.C.1, England) September 7-12, 1953.

INTERNATIONAL SOCIETY OF SURGERY CONGRESS, Lisbon, Portugal. (Dr. L. Desjardin, General Secretary, rue Belliard, Brussels, Belgium) September 14-20, 1953.

INTERNATIONAL CONGRESS OF PÆDIATRICS, Havana, Cuba (Prof. Felix Hurtado, President, 5a Avenue 124, Miramar, Havana, Cuba) October 12-17, 1953.

NEWS ITEMS

ALBERTA

The members of the Parsons Clinic of Red Deer are paying recognition to the founding of the clinic by Dr. Richard Parsons, F.R.C.S. fifty years ago. Dr. Parsons arriving in 1903 chose Red Deer as the place to commence practice. He was not wrong as later years have proved: Red Deer has become one of the better known medical centres in Central Alberta. This fine progress is due to the good work of the late Dr. Richard Parsons and the other pioneer men of his day together with the fine type of medical men in and about the City of Red Deer. Among the members of the Parsons Clinic are Dr. R. M. Parsons and Dr. W. B. Parsons sons of the founder. In this day of change we are glad to see some of those institutions which survive and we congratulate the members of this clinic on their fiftieth anniversary.

Dr. Mary Jackson of Keg River has published, in the August issue of the *Alberta Medical Bulletin*, an interesting review of the rabies outbreak in that part of Alberta. Dr. Jackson brings out many valuable observations not noted in the usual rabies story.

Dr. John Melling of Wetaskiwin is convalescing nicely from a recent surgical procedure at the University hospital. We wish him an early return to his extensive practice. Dr. Melling is one of three brothers in the medical profession. W. CARLETON WHITESIDE

BRITISH COLUMBIA

The town of Kelowna, in the Okanagan, has for many years been carrying out a program of control of mosquitoes, which constitute a very prevalent plague in the Okanagan, with its fresh-water lakes and sloughs. They have a system of spraying with insecticides, and application of oil, carefully worked out according to the season. This is carried out at the taxpayers' expense, of course, but apart from the increased comfort gained by mosquito-control, there would seem to be a further gain. The city engineer, Mr. Geo. Meckling states that Kelowna has the lowest polio rate of any interior city in B.C.

The death on July 21 of Dr. Herman Robertson of Victoria, brings to a close a most notable career, and deprives the British Columbia profession of a very gallant and well beloved gentleman: a man of great charm, and a doctor of the very best school, old or new.

Herman Robertson was in practice in Victoria for 50 years and more—and everybody in Victoria knew and loved him. His profession was his first interest—he graduated with high honours, and continually kept up to date with postgraduate work. He served as a colonel in the C.A.M.C. in the first World War.

His second great interest was music, of which, like all his family (the Robertson family is one of the oldest and best-known families of B.C.) he was devotedly fond. His wife was a musician, too, and their home was full of music. He had a pipe organ installed in his house, and was always at it. As a young man, he had a magnificent tenor voice—and was always in demand as a singer. His personality was delightful—he was friendly and generous to a degree. He will be greatly missed by his myriads of friends. It is a pleasure to think that less than a month before he died he received a senior membership in the Canadian Medical Association at the Winnipeg Meeting of that body.

The program of the Annual Meeting of the B.C. Division of the Canadian Medical Association is now in print. The meeting will be held in the Hotel Vancouver from September 22 to September 25. The Annual Meeting of the College of Physicians and Surgeons of B.C. will be held on September 22 in the evening.

British Columbia has been honoured by the decision of Dr. Brock Chisholm, so well known to all Canadian medical men, to make his home in this province, on his retirement from active work. Dr. Chisholm has for the past five years been Director-General of the World Health Organization of the United Nations, and his work in this capacity has brought him international recognition. The Lasker Award of the American Public Health Association was given him last year. He is a man who thinks for himself, and is not afraid to say what he thinks. One can hardly doubt that we shall hear more from him in the years to come.

Polio is active in B.C. as in other provinces. Up to the middle of July some 97 cases have been reported, with four deaths. In 1952 for the same period there were 29 cases: but we are hoping that the general experience of 1952 with 595 cases and 38 deaths, will not be repeated. The Yukon has had quite an epidemic, with 140 cases and nine deaths up to July 11.

A new service has been provided by the B.C. Division of the Canadian Arthritis and Rheumatism Society, whereby travelling teams of consultants and members of the advisory board of C.A.R.S. will visit interior points in the province. Various areas have requested this service, such as Kelowna, Prince Rupert, West Kootenay and East Kootenay. These centres will be visited first, and others as they ask for it. The family doctor will arrange for consultations, provide x-ray and laboratory reports and so on.

A move towards improvement of the somewhat chaotic hospital situation in British Columbia, has been made recently by a gathering of municipal and other representatives called by the Community Chest of Vancouver. This organization has urged a 500-bed chronic hospital with rehabilitation facilities. The cost of building and maintaining such a hospital would be certainly not more than half that of the active treatment or acute hospital. It is greatly to be hoped that these suggestions will soon become plans leading to realization.

The Metropolitan Health Department of Vancouver announces some changes in its staff. Dr. M. A. Menzies has joined the Health Department—he is the son of Dr. A. M. Menzies, assistant medical Health Officer, who has done such good work for many years as assistant to Dr. Stewart Murray, Chief Medical Health Officer. Dr. J. C. White, who has been taking postgraduate research work at the University of Toronto, and Harry Hzkow, M.Sc. (Columbia University, New York) have also rejoined the city staff.

In the report a tribute is paid to two public health nurses who have recently been superannuated from the Metropolitan Health Service. These are Miss Allena B. Croll, who has been working in the department since 1924, and Miss Grace Cowan, who joined the staff in 1935. They have been concerned mainly with child welfare work and school nursing.

A recent report of the Provincial Health Department deals with the use of caramels containing diphtheria toxoid, which will make the oral ingestion of the toxoid possible as an immunizing agent. Experiments have been carried on with these caramels, and are very encouraging. It is hoped that their use in schools, etc., may become a regular thing in time to come.

J. H. MACDERMOT

MANITOBA

Dr. Eugene Morigi has been appointed temporarily as a staff physician at the Central Tuberculosis Clinic, Winnipeg. He was born in Istanbul, Turkey, and educated in Italy. Since coming to Manitoba Dr. Morigi has been employed at St. Boniface and Deer Lodge Hospitals.

John Houston McBeath, F.R.C.S. (Edin.) recently of Glasgow, has taken up practice in the department of urology, Manitoba Clinic, Winnipeg.

Manitoba doctors are reversing the usual practice of moving to the Pacific coast when retiring. Dr. D. C. Aikenhead and Mrs. Aikenhead left on July 18 for Burlington, Ont. and Dr. and Mrs. Frank Benner will leave at the end of August to make a new home in Aylmer. Dr. Aikenhead has been head of the Department of Anaesthesia in the Winnipeg General Hospital and has taught that subject to generations of medical students and interns. Dr. Benner was for a long time superintendent of Grace Hospital. The good wishes of their many Manitoba friends for many pleasant years go with them.

A dinner was tendered to Dr. John A. Gunn in Manitoba Club on July 29, on his seventy-fifth birthday. John Gunn had an enviable record in World War I, both as an administrator and surgeon. He was awarded the O.B.E. and the C.B. After his return he was appointed Professor of Surgery in the University of Manitoba, and later was surgeon for the Canadian Pacific Railway.

Since January 1, Manitoba has had over 300 cases of poliomyelitis with about two-thirds showing some paralysis. It is hoped that the peak of the epidemic may be reached early in August. Additional supplies of gamma globulin have been received in Manitoba so that contacts with paralysis cases may be immunized. Considerable insurance against poliomyelitis is being sold. Dr. M. R. Elliott, Deputy Minister of Health, reports that the nursing shortage is still acute. ROSS MITCHELL

NOVA SCOTIA

During the month of June the Postgraduate Committee of the Faculty of Medicine of Dalhousie University organized the following lecture tours: On June 12 the Valley Medical Society held a meeting in Kentville at which the following presentations were given: Dr. J. S. Bagnall on "Fractures of Mandible and Maxilla", Dr. E. F. Ross, "Injuries to the Ankle Joint" and Dr. B. K. Coady, "Internal Derangement of the Knee Joint". From June 14 to 18 Dr. Clarence L. Gosse conducted a tour of Newfoundland, speaking at Corner Brook, Grand Falls and St. John's on "Problems Associated with Urinary Infections". He also visited several hospitals.

A Symposium on Nephritis was held at Yarmouth at meetings of the Western Nova Scotia Medical Society on June 23 and 24. Dr. D. J. Tønning opened the discussions on the evening of the 23rd with some of the clinical aspects and Dr. C. M. Harlow gave the biochemical and pathological aspects. The following day, further discussions were held and particular attention was directed toward treatment and the laboratory tests required. Colchester-Hants Medical Society held a meeting on June 26 at which Dr. Lea C. Steeves was the guest speaker. His subject was "The Management of Cardiac Emergencies". Also on June 26 the Lunenburg Queens Medical Society held a meeting and the guest speaker was Dr. F. Gordon Mack. He spoke on "Problems with Chronic and Persistent Infections of Urinary Tract".

The annual report of the Postgraduate Committee of Dalhousie University for the year 1952-53 shows 60 lectures and clinics given by members of the Medical Faculty at various provincial centres with a total attendance of 1,308 practitioners; 861 doctors attended lectures given by ten distinguished visitors from U.S.A. and other Canadian centres. Seven intensive short courses were held in Halifax and the attendance at these totalled 72.

We are pleased to see Dr. Allan Morton, Commissioner of Health for the City of Halifax, about again after several months' illness.

Miss Barbara Blauvelt, Secretary to the Dean of Medicine, left for Vancouver July 1 where she will be a delegate to the Baptist Convention. Miss Blauvelt intends to visit several of the other medical schools across Canada on her return trip. C. M. HARLOW

NEW BRUNSWICK

Dr. C. M. Oake of St. Martins, New Brunswick, has been promoted from the rank of Surgeon Commander to Captain in the Naval Reserve of Canada.

Dr. E. A. Petrie of Saint John delivered the Welch Memorial address at the International Meeting of X-ray Technicians held in Toronto in June.

Dr. Darius Albert was elected president of the Mada-waska Branch of the New Brunswick Cancer Society.

Dr. A. L. Donovan of Saint John is recovering from a serious surgical operation at the Saint John General Hospital.

Dr. O. B. Evans of Saint John is convalescing at his home after several months' stay in hospital.

Dr. R. J. Dolan, N.B. Director of Hospital Services attended the meetings of the Canadian Hospital Association and the Continuing Committee on Hospital Statistics at Ottawa in May.

Dr. J. F. McInerney, Minister of Health for the Province of New Brunswick, addressed the General Council of the Canadian Cancer Society during their meeting in Fredericton in June; at a banquet provided by the Government of this Province.

Dr. McInerney, as Honorary President, presided at the opening session of the Maritime Conference on Social Work held in Fredericton, June 16 to 18.

Dr. F. H. George of Saint John recently passed the Staff Command Course Examination of the Department of Defence for promotion to Lieut.-Col. with distinction.

The new \$3,000,000 Base Hospital for South Eastern New Brunswick was opened on July 21 at Moncton by Lieut.-Governor D. L. MacLaren and the New Brunswick Minister of Health, Dr. J. F. McInerney. Dr. D. F. W. Porter is Director of the hospital and Mr. Leonard Lockhart is Chairman of the Hospital Board. This splendid building is a great and useful addition to the hospital facilities of the province, strategically placed to serve the thriving city of Moncton and its surrounding territory. A. S. KIRKLAND

ONTARIO

Dr. A. H. Singleton and Dr. C. L. Ash, Toronto, attended the seventh International Congress of Radiology held in Copenhagen, Denmark.

Dr. J. A. MacFarlane attended the International Conference on Medical Education under the auspices of the World Medical Association in London, England in August.

Dr. Gordon Murray and Dr. Burns Plewes will attend the International Society of Surgery at Lisbon, Portugal in September.

Dr. Allan Walters and his wife Dr. Kathleen Walters will attend the fifth International Neurology Congress at Lisbon, and later go on to the Cajal centenary held at Madrid.

Dr. H. H. Hyland, Dr. Allan Walters and Dr. J. L. Silversides are giving papers at the British Neurological Society in London in August.

Dr. W. R. Feasby is attending the World's Conference of Medical Editors at the Hague, and also the World Medical Association meeting there.

About 4,000 members attended the ninetieth annual American Veterinary Medical Association meeting held in Toronto. Among the speakers was Dr. Desmond Hill of University College, Ibadan, Nigeria. He said that West Africa has most of the North American disease problems in addition to those that are peculiar to that area. Importation of poultry for experimental cross-breeding recently introduced Newcastle disease to Nigerian poultry flocks. Dr. Martin Baum, Colorado, said that rabies had appeared for the first time among wild life in the Rocky Mountains. Dr. Thomas Childs, veterinary director-general of the Canada Department of Agriculture, said that strict controls on feeding of garbage to swine had helped to limit trichinosis in Canada.

The second International Conference to study the effect of alcohol on road traffic is to meet for four days in September at Hart House, University of Toronto. The first conference was held in Sweden in 1950. Experts will contribute such subjects as "Functional Tests and Alcohol Levels", "Comparative Legislation and Enforcement" and "The Effectiveness of Educational Procedures".

The fifth International Congress on Mental Health was held at the University of Toronto in August. The Federation has consultative status with UNESCO and the World Health Organization. The theme of the meeting was "Mental Health in Public Affairs".

The province of Ontario, which has the lowest death rate from tuberculosis of any province in Canada, spends approximately nine million dollars a year controlling this disease. In 1951 the number of deaths from TB was 578, or a rate of 12.6, well below the Canadian average of 24.5 per 100,000. Ontario has 8.6 treatment beds per death or a ratio of one bed to every 877 of the population. The province has 266 diagnostic chest clinics where in 1951 examinations were made of 117,927 patients. Persons examined in mass surveys numbered 521,000. One active case was found for every 1,742 examined. Sixteen per cent of all new cases admitted to sanatorium in 1951 were found because of mass surveys.

LILLIAN A. CHASE

QUEBEC

Drs. Lisbeth Sloman, Hugh Brodie and John Elder, all interns at the Children's Memorial Hospital, Montreal, are the winners at McGill University of the first Mead Johnson awards for postgraduate studies in paediatrics. Drs. Sloman and Elder will continue their work at the Children's Memorial during the coming year under the terms of the awards. Dr. Brodie will work in paediatrics at the Children's Medical Centre in Boston.

This month your reporter is relaxing with his family at one of the lakes in the beautiful Eastern Townships of Quebec. The first part of the vacation was marred by a sudden illness in the family, necessitating prompt hospitalization. This, however, had a happy association as it gave me an opportunity to view at first hand the workings of one of our smaller hospitals, the lovely new Sherbrooke Hospital.

We tend to be concerned chiefly with our larger teaching and university hospitals, too often forgetting the excellent work carried on by the smaller less publicized ones. We were greatly impressed with the excellent friendly personal care given by everyone concerned.

A. H. NEUFELD

Les Comités des Spécialistes chargés de considérer les demandes de certification se réuniront au cours du mois de décembre 1953. Les médecins dont les études et l'entraînement post-scolaires sont terminés, voudront bien présenter leurs requêtes avant le 15 novembre, ceci permettant aux comités concernés d'obtenir les renseignements jugés nécessaires.

Tout aspirant au certificat voudra bien noter, que conformément à nos règlements, des certificats sans examen pourront être émis jusqu'au 1er juin 1955.

Pour fins d'octroyer des certificats de compétence, le Bureau Provincial de Médecine du Québec reconnaît les spécialités suivantes: (1) Anesthésie. (2) Dermatologie et syphiligraphie. (3) Chirurgie générale. (4) Médecine interne. (5) Allergie. (6) Cardiologie. (7) Maladies pulmonaires & T.B. (8) Gastro-entérologie. (9) Neurologie et/ou psychiatrie. (10) Neuro-chirurgie. (11) Obstétrique et/ou gynécologie. (12) Ophtalmologie. (13) Urologie. (14) Chirurgie orthopédique. (15) Otorhinolaryngologie. (16) Pédiatrie. (17) Pathologie clinique, bactériologie et anatomie pathologique. (18) Médecine physique. (19) Chirurgie plastique et reconstructive. (20) Radiologie diagnostique et thérapeutique. (21) Chirurgie thoracique. (22) Hygiène.

Copies des règlements et normes de formation post-universitaire ainsi que des formules de demande peuvent être obtenues en s'adressant au Collège des Médecins et Chirugiens de la Province de Québec, 1896 ouest, rue Dorchester, Montréal.—FI: 5205.

JEAN PAQUIN

SASKATCHEWAN

In consultation with a Committee of the College of Physicians and Surgeons of Saskatchewan the Provincial Government has redrafted and clarified the regulations with regard to the responsibility of the government in relation to poliomyelitis care.

The responsibility for medical care of acute poliomyelitis rests with the patient or his family and two centres, one in Regina and one in Saskatoon have been established. These centres will handle the severely ill or complicated cases. The Minister of Public Health may pay for the hospitalization for persons not covered by the Saskatchewan Hospital Services Plan and for special nursing services on request of the centre's director. Provision has also been made for referral by attending doctors to the consultant at the two centres for long-stay cases. In Saskatoon Dr. John Dundee has been named as the Director and Consultant and in Regina the Chief of Medicine of the Regina General Hospital will continue to serve as the advisor.

The College Committee recommended that each hospital, where centres are located, should appoint a committee of the medical staff to act as advisor to the Director of the centre and that this group will, in its turn, advise and help with special consultation on various matters as required. In both Regina and Saskatoon the Department of Public Health operates centres for patients with residual disabilities who require physical restoration services and who are referred to the centres by the attending doctors.

Indications to date are that the 1953 incidence will be much lower than last year.

Dr. Rudolph Ekstein, senior clinical psychologist of the Menninger Foundation, lectured at a recent psychiatric services institute in Regina. This institute was one of a series which are part of a resident training program in psychiatry for physicians who are taking post-graduate training under the supervision of the University of Saskatchewan Medical College. Outstanding lecturers for these institutes are financed through grants from the Commonwealth Fund.

As a result of the recent unfavourable decision against the College in the Arnott case the College, through its solicitor, G. H. Yule, Esquire, Q.C., has decided to launch an appeal.

Mr. Yule, in his appeal, based his arguments on the following grounds: (1) The learned trial Judge erred in instructing the jury that the words complained of were capable of a defamatory meaning. (2) The learned trial Judge erred in instructing the jury that the words complained of were capable of being understood as defamatory of the plaintiff. (3) The finding of the jury that the words complained of were defamatory is perverse. (4) The finding of the jury that the words complained of are defamatory of the plaintiff is perverse. (5) The learned trial Judge erred in not directing the jury in accordance with Section 5 of the Libel and Slander Act R.S.S. 1940 Chapter 90. (6) He erred in holding that there was proper evidence adduced by the plaintiff to connect the plaintiff with the alleged libel. (7) He erred in not holding the Defendant's *Quarterly* was published on a privileged occasion. (8) He erred in not ruling on the question of privilege before the case went to the jury. (9) He misdirected the jury as to the meaning of the word "quackery" and the word "quack". (10) He erred in not adequately putting the defendant's case to the jury and in not explaining to the jury what the real issues between the parties were on the pleadings. (11) He erred in admitting evidence of the witnesses who claimed they had received the Koch treatment, and he erred in admitting evidence of the plaintiff and others as to the administering of the Koch treatment.

(12) He erred in admitting the evidence of His Honour Judge Brickenden. (13) He erred in admitting in evidence the copy of letter from the witness Evans to the Honourable Mr. Bentley. (14) He erred in admitting in evidence the letter or copy of letter from the doctor in Belgium. (15) The appellant respectfully submits that the trial was unsatisfactory in that the learned Judge took an undue part in the examination and cross examination of witnesses and adopted to the prejudice of the defendant a hostile attitude toward the defendant's case. (16) He misdirected the jury by virtually directing the jury that they were bound to find that the words complained of were defamatory and also that they were defamatory of the plaintiff.

(17) He erred in not holding that there was no proper evidence to connect the plaintiff with the alleged libel.

G. W. PEACOCK

NEWS OF THE MEDICAL SERVICES

Canadian Armed Forces

Naval Headquarters has recently announced several changes in appointments of naval medical officers. Surgeon Captain T. B. McLean, C.N., R.C.N., at present Deputy Medical Director General in Naval Headquarters, is being appointed to Esquimalt, B.C. as Command Medical Officer, Pacific Coast. Surgeon Commander G. W. Chapman, R.C.N., of Victoria is appointed to Naval Headquarters as Deputy Medical Director General.

Other changes in the appointments of principal medical officers afloat are: Acting Surgeon Commander M. H. Little, R.C.N., of the cruiser *Quebec* is appointed to R.C.N. Hospital, Halifax and is being replaced by Surgeon Lieutenant Commander R. F. Plumer, R.C.N.(R).

Surgeon Lieutenant Commander J. W. Green, R.C.N., is appointed to the cruiser *Ontario* to replace Surgeon Lieutenant Commander J. H. Fleming, R.C.N., who will be the radiologist in R.C.N. Hospital, Esquimalt, B.C.

Surgeon Lieutenant Commander D. B. Maunsell, R.C.N., who has recently completed a course in surgery at the U.S. Naval Medical Centre, Bethesda, Maryland, will go to the aircraft carrier, *H.M.C.S. Magnificent* and the present principal medical officer, Surgeon Lieutenant Commander R. F. Hand, R.C.N., is being appointed to R.C.N. Hospital, Halifax, N.S.

Army Promotions:

Lt.-Col. K. J. Coates, O.B.E., C.D., of the staff of the Director General of Medical Services has been promoted to the rank of Colonel and appointed Officer Commanding, R.C.A.M.C. School, Camp Borden.

Maj. V. H. Radoux, formerly Area Medical Officer, New Brunswick Area, has been promoted to the rank of Lieut.-Colonel and appointed to command Quebec Military Hospital.

Maj. W. H. R. Croskery, Officer Commanding, Whitehorse Military Hospital, has been promoted to the rank of Lieut.-Colonel and will command Canadian Section, No. 1 British Commonwealth Hospital, Kure, Japan.

Appointments:

Col. R. J. Nodwell, C.D., Medical Liaison Officer in Washington has been appointed Deputy Director General of Medical Services at Army Headquarters. He was replaced in Washington by Lieut.-Col. R. D. Barron, M.C., who was formerly Officer Commanding, Montreal Military Hospital.

Lieut.-Col. R. B. Murray, E.D., has been appointed Officer Commanding, Montreal Military Hospital while Lieut.-Col. A. F. Nancekivell, formerly Officer-in-Charge of Medicine in Toronto Military Hospital has been appointed to the same position in Montreal Military Hospital.

Two veterans of the Korean War, Lieut.-Cols. E. H. Ainslie, C.D., who has had a successful tour of duty as Officer Commanding, Canadian Section, No. 1 British Commonwealth Hospital, Kure and R. A. Smillie, M.B.E., who commanded 38 Field Ambulance in Korea, have been appointed to posts in Canada, the former as Officer-in-Charge of Medicine, Toronto Military Hospital and the latter as Officer Commanding, No. 25 Field Ambulance.

Lieut.-Col. J. P. McCabe, who had been employed in the preparation of Medical History, has been appointed to the staff of the Director General of Medical Services.

Lieut.-Col. J. L. Kinsman, who has returned from U.S.A. after successfully completing a course at the Brook Army Medical Centre at Fort Sam Houston, Texas, has been appointed to command Kingston Military Hospital.

Maj. R. Feultault, Kingston Military Hospital, has been appointed Officer Commanding, Whitehorse Military Hospital.

Courses:

Lieut.-Col. M. Fitch, who commanded No. 37 Field Ambulance, is attending a Senior Officers Course in the United Kingdom while Lieut.-Col. A. G. McLaren, formerly in command of Kingston Military Hospital, and Maj. R. C. Elliott, formerly in command of Churchill Military Hospital, are attending a course at the Brook Army Medical Centre, Fort Sam Houston, Texas.

Replacements:

Maj. R. K. Muir, C.D., vacates the appointment of Area Medical Officer, Saskatchewan Area and has been replaced by Maj. B. D. Jaffey, M.B.E., appointed Area Medical Officer of New Brunswick Area.

Maj. P. H. Bazinette has proceeded to Europe as a replacement medical officer. Maj. F. L. Lawson and Capt. J. M. Tremblay have been posted to Korea.

Group Captain B. R. Brown, former Staff Officer Medical Services R.C.A.F. Training Command Headquarters, Trenton, Ontario, proceeded on postgraduate studies on August 16, 1953. He was replaced by Wing Commander H. Bright who was transferred from the Central Medical Establishment, Institute of Aviation Medicine, Toronto.



in weight reduction

One 'Dexedrine' Spansule capsule gives day-long appetite control—between meals as well as at mealtime.

Each 'Dexedrine' Spansule capsule is filled with many tiny coated pellets containing dextro-amphetamine sulfate, S.K.F. The coatings are so designed that they disintegrate at pre-determined intervals in the gastrointestinal tract. As the coatings disintegrate, the active ingredient is released for absorption. The disintegration intervals are spaced to provide continuous and uniform therapeutic effect for a 10-12 hour period.

'Dexedrine' SPANSULE†

Available in 2 strengths—10 mg. and 15 mg. SMITH KLINE & FRENCH • Montreal 9

†'Dexedrine' Reg. Can. T.M. Off. Trade Mark for S.K.F.'s brand of sustained release capsules

Wing Commander R. H. Lowry, A.F.C., was promoted to that rank on July 1, 1953 and transferred from the Institute of Aviation Medicine to the Canadian Joint Staff, Washington, D.C. on July 15, 1953 to assume the duties of Medical Liaison Officer.

Squadron Leader J. H. Murray was transferred from R.C.A.F. Station Aylmer, Ontario to the Flying Personnel Medical Establishment, Institute of Aviation Medicine, Toronto on August 15, 1953.

The R.C.A.F. Medical Branch in conjunction with Canadian Army and United States Air Force have completed details for the Aero-Medical evacuation of Canadian Army casualties from the United Kingdom and Continental Europe. These patients will be transferred to Westover Air Force Base, Massachusetts, by United States Air Force. From Westover Air Force Base they will be transported by R.C.A.F. to the Service Hospital nearest their homes. These aero-medical evacuees are to have full medical and nursing care during the entire trip.

NEWS AND NOTES

THE AMERICAN BOARD OF OBSTETRICS AND GYNÆCOLOGY

Applications for certification (American Board of Obstetrics and Gynæcology) for the 1954 Part I Examinations are now being accepted. Attention of all candidates is called to a change in date. Application for examination or re-examination as well as requests for resubmission of case abstracts, must be made to the Secretary prior to October 1, 1953. Current Bulletins are now available and may be obtained by writing to: Robert L. Faulkner, M.D., Secretary, American Board of Obstetrics and Gynæcology, 2105 Adelbert Road, Cleveland 6, Ohio.

SYMPOSIUM ON PROTEIN METABOLISM

Under the joint auspices of the School of Graduate studies and of the Department of Public Health Nutrition of the University of Toronto a symposium on protein metabolism will be held in the lecture theatre of the Wallberg Building, College and St. George Streets, on Friday, October 30.

The speakers and subjects are as follows: Dr. J. R. Beaton (University of Toronto): The relation of vitamin B₆ and of riboflavin to protein metabolism. Dr. Bacon F. Chow (Johns Hopkins University): The interrelation of vitamin B₁₂, steroids and proteins. Dr. A. E. Axelrod (Western Reserve University): The rôle of vitamins in antibody formation. Dr. O. E. Gaebler (Henry Ford Hospital): The pituitary and protein metabolism. Dr. Ruth Leverton (University of Nebraska): Amino acid requirements of man. Dr. Paul R. Cannon (University of Chicago): Factors influencing amino acid utilization in tissue protein synthesis. Dr. J. S. L. Browne (McGill University): Adrenals and protein metabolism. Dr. Herbert Pollack (Mt. Sinai Hospital, New York): Amino acids and proteins in therapy.

Attendance at this symposium is made possible by a grant from the National Vitamin Foundation. There will be no registration fee. Further information can be obtained from the Department of Public Health Nutrition, School of Hygiene, University of Toronto, Toronto 5.

EIGHTEENTH ANNUAL CONVENTION OF THE NATIONAL GASTROENTEROLOGICAL ASSOCIATION

The National Gastroenterological Association will hold its Eighteenth Annual Convention and Scientific Sessions at The Biltmore Hotel in Los Angeles on October 12, 13, 14, 1953.

Following the Convention, on October 15, 16, 17, 1953, the Association's Fifth Annual Course in Postgraduate Gastroenterology will be given at The Biltmore Hotel and the College of Medical Evangelists in Los Angeles. The Course will be under the personal direction of Drs. Owen H. Wangenstein of Minneapolis, Minn. and I. Snapper of Chicago, Ill., who will be assisted by a faculty from the medical schools in and around Los Angeles.

The Scientific Sessions on October 12, 13 and 14 are open to all physicians without charge. The Postgraduate Course will only be open to those who have matriculated in advance. Further information concerning the program and details of the Postgraduate Course may be obtained by writing to the Executive Officer, National Gastroenterological Association, 1819 Broadway, New York 23, N.Y.

Battle deaths among United States forces in Korea have been little more than one-tenth the number in World War II, statisticians of the Metropolitan Life Insurance Company point out.

More than 24,000 battle deaths among U.S. armed forces have been officially reported to next of kin during the three years of hostilities. Allowing for deaths among men still listed as missing, the statisticians estimate that the United States battle death toll in Korea is about 32,000. In comparison, well over 50,000 battle deaths occurred in the Army land forces alone in the Pacific area during World War II.

Our battle death rate in Korea, based upon the estimated total death toll of 32,000, averaged 3.5 a year for each 1,000 men under arms from June 1950 to June 1953. During World War II the average was 8.9 per 1,000 a year.

The heaviest losses in Korea were suffered in the early months of the conflict. For the second half of 1950 the battle death rate for all Americans in the armed forces, based on notifications of next of kin, was 7.9 per 1,000 a year. The rate dropped to 3.2 in 1951 and to 1.3 in 1952. It was 1.1 up to June 12 of this year.

"The very low death rate from disease among our armed forces in Korea indicates how very effective our military medical services have been despite the handicap of singularly difficult conditions," the statisticians concluded. "Poor, often primitive, environmental sanitation; the high prevalence of infectious diseases; and extremes of temperature created many serious health problems which have been satisfactorily met.

"Losses resulting from exposure to cold have been reduced by instructing officers and enlisted men in

(Continued on page 72 of the advertising section)

(Continued from page 321)

According to the manufacturer's literature the temperature in the puddle chamber should be 210° F. (99° C.), but we have been unable to raise the temperature above 89° C. even after making various adjustments of steam and water flow as suggested by the manufacturer. It is apparent that this type of still may not ensure adequate preheating of the tap water and that chloramines may be steam-distilled over.

We have found that the chlorine in the distilled water can be removed by treatment with activated charcoal or by passage through an ion-exchange type of water purifier. Boiling in an open container may be sufficient to reduce the concentration of chlorine to an insignificant level when small volumes of water are concerned.

University of Alberta.

Keep pills and tablets in a **'kidipruf' safety container**

the pill box a child cannot open

Sooner will a camel pass
through the needle's eye
than a kiddie open a
'kidipruf'
safety container



YOU CAN

An adult can easily open a Kidipruf Safety Container by pressing on the centre. The cap is captive—it cannot get lost, being secured to the container by a patented anchor.

PHYSICIANS ARE INVITED to write to address below for a free specimen of 'Kidipruf' Safety Container for their medical bag to keep potentially dangerous drugs out of children's reach. After all, the loss and theft of the bag generally from cars is not unusual.

Further supplies obtainable from Druggists for 25¢ less professional discount.

A KIDDIE CAN'T

No normal child of under five, or in many cases up to 8-9 years of age, would have either the hand span or strength of finger to open the lid.



Sole licensees for medical profession and druggists in Canada:

INTERNATIONAL MEDICINES LTD., 445 St. Francois Xavier St., Montreal

BOOK REVIEWS

THE BRITISH ENCYCLOPÆDIA
OF MEDICAL PRACTICE

Under the General Editorship of the Rt. Hon. Lord Horder, Extra Physician to H.M. The Queen, Consulting Physician to St. Bartholomew's Hospital, London. 2nd Edition, Vol. 1 to 12 Incl. Butterworth & Co. (Canada) Ltd., Toronto, 1953.

The first volume of the first edition of this Encyclopædia, brilliantly edited by Sir Humphry Rolleston, appeared in 1936. So much has happened in medicine since then that publication of a new edition was inevitable. Volume one of the new second edition, edited by the Rt. Hon. Lord Horder, appeared in 1950 and by now all twelve volumes of the second edition are out. Volume one deals with Abdominal Emergencies to Anus Diseases, while volume twelve covers Talipes to Yellow Fever. The text is well set out under large headings and in heavy print.

Lord Horder has set out to bring this edition thoroughly up to date and he has accomplished the difficult task admirably. The many advances that have been made in all branches of medicine have been covered thoroughly and systematically. Many chapters have been completely rewritten and new chapters have been included. All the contributors to this monumental work are specialists in their various fields, thus assuring that the latest and most practical information in each specialty is made available to the reader. It is unfortunate that during the inevitable interval between the preparation of the material and its publication important advances may occur, particularly in those subjects in which development is most active.

The medical practitioner will not fail to find in this work the answers to the many medical problems which arise in his practice. The new edition should indeed live up to the expectation of the editor of being a guide and a friend to the busy practitioner and to the student.

DISEASES OF THE SKIN

R. M. B. MacKenna, Physician-in-Charge of the Dermatology, St. Bartholomew's Hospital and Medical College, London. 611 pp. Illust. \$7.15. 5th Edition. Baillière, Tindall and Cox, London W.C. 2; The Macmillan Company of Canada Ltd., Toronto, 1952.

After numerous delays in publishing, this fifth edition was made available to the medical profession in the fall of 1952. The original text first published by the late Robert W. MacKenna, has been completely revised by his son, Robert M. B. MacKenna. The present volume has been brought up to date with the inclusion of new chapters on the most recent advances in dermatology.

The book is clearly written and comprehensive in its outline and will prove to be of practical value to students, practitioners, or specialists, who desire a logical

explanation of the fundamentals of dermatology. Its worth to instructors in dermatology must be noted. The logical grouping of the various dermatological conditions is an outstanding feature of this book. One notes with pleasure the increased number of coloured prints illustrating the common dermatological entities. The simplified basic approach to histology will prove to be a boon to students and the practical non-complicated therapeutic suggestions will aid materially in the handling of the problems met with in cutaneous medicine. With his usual generosity the author gives credit to a worldwide list of outstanding authorities for their contributions of the wealth of dermatological knowledge.

In these days of rising costs it is surprising that a volume of this size and worth can be published at such a moderate price.

FUNDAMENTALS OF CLINICAL CANCER

L. B. Goldman, Clinical Professor of Radiotherapy, New York Medical College, Flower and Fifth Avenue Hospitals. 312 pp. Illust. \$10.50. Grune & Stratton, New York; The Ryerson Press, Toronto, 1953.

The main attraction of this useful little book are its illustrations. The photographs and diagrams are admirable; a reader, who is hard-pressed for time, may expect to find the answer to a problem in this field with a minimum of reading. This book is intended for physicians who diagnose and treat cancer. The practitioner will find in it the fundamentals of the early diagnosis of cancer, the surgeon and therapist will find information about treatment; attention is also drawn to known preventive measures. The author felt that a book was needed, in which the fundamentals of the early diagnosis of cancer and its treatment would be given primary consideration, without being obscured by the bulk of information now available on more advanced lesions. He has tried to do this by limiting the text and illustrations, where possible, to those lesions which can be controlled. Following an introductory chapter on "General Considerations", the topics are arranged according to the anatomical site of the tumour. The book may be recommended to all practising physicians and surgeons.

THE PRENATAL ORIGIN OF BEHAVIOR

D. Hooker, Professor of Anatomy and Chairman of the Department, University of Pittsburgh School of Medicine. 143 pp. \$2.50. University of Kansas Press, Lawrence Kansas, 1952.

Recognizing that behaviour is a fundamental characteristic of all animals, whether adult or developing, unicellular or multicellular, Dr. Hooker, in his Porter Lecture, of which this little book is a record, deals with fetal activity of infra-human vertebrates as well as fetal activity in the human.

Structure and function are inseparably related in the living organism; this is as true of an organism which is developing as it is of the adult. The activities of the mechanisms involved in restoring the dynamic balance

saves time...saves lives



6% solution of DEXTRAN in normal saline.

Available also in 'salt-free' and 'salt-free'

with glucose forms; 540 cc. bottles.

INTRADEx

Trade mark

BLOOD VOLUME EXPANDER

GLAXO (CANADA) LTD., 26, DUNCAN STREET, TORONTO, ONTARIO

CONNAUGHT

LIVER EXTRACT INJECTABLE

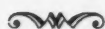
(20 MICROGRAMS OF VITAMIN B₁₂ PER CC.)

Liver Extract Injectable is prepared specifically for the treatment of pernicious anaemia. The potency of this product, which was formerly expressed as 15 units per c.c., is now expressed in micrograms of Vitamin B₁₂ as determined by the *Lactobacillus leichmanii* test. Liver Extract Injectable as prepared in the Connaught Medical Research Laboratories

- contains 20 micrograms of vitamin B₁₂ per cc. derived directly from liver.
- is carefully tested for potency.
- is low in total solids and light in colour.
- is very highly purified and therefore can usually be administered without occurrence of discomfort or local reactions.

Liver Extract Injectable (20 micrograms of vitamin B₁₂ per cc.) is supplied in packages containing *single* 5-cc. vials, in multiple packages containing *five* 5-cc. vials, and in 10-cc. vials.

Dry Liver Extract for Oral Use is supplied in packages containing ten vials; each vial contains extract derived from approximately one-half pound of liver.



CONNAUGHT MEDICAL RESEARCH LABORATORIES
University of Toronto Toronto, Canada

Established in 1914 for Public Service through Medical Research and the development of Products for Prevention or Treatment of Disease.

of the organism as a consequence of environmental changes give rise to bodily activity, which is the externally visible or overt expression of the functional capacity of the whole organism. Dr. Hooker believes that the behaviour of vertebrate animals, including man, has its origin in the early exteroceptive responses exhibited during embryonic life. It seems probable that there is a basic similarity in the succession of responses which may be elicited from vertebrate organisms in external stimulation. Each form of activity shown by the fetus, is a step in the normal development, and hence a step in the preparation for postnatal behaviour. There is an apparent tendency for voluntary acts when and where they appear to develop in a sequence based upon earlier reflexes of prenatal life. The frontiers of research in the development of fetal activity have by no means been reached. Dr. Hooker has admirably succeeded in reviewing information which has so far accumulated in this field.

PAIN SENSATIONS AND REACTIONS

J. D. Hardy, Associate Professor of Physiology, Cornell University Medical College; H. G. Wolff, Professor of Medicine (Neurology), Cornell University Medical College; and H. Goodell, Research Fellow in Medicine, Cornell University Medical College. 435 pp. illust. \$7.25. The Williams and Wilkins Company, Baltimore; Burns & MacEachern, Toronto, 1952.

The assessment of the intensity of pain in human subjects, and of the adequacy of remedial agents used in its treatment, has been notoriously difficult. For obvious reasons, animal experiments have not been entirely satisfactory. The authors retrace the emergence of the various concepts of pain. After due consideration of the form and functions of structures subserving pain, they go on to discuss methods for the study of pain thresholds, the pricking pain threshold in man, burning pain, aching pain, pain intensity, the nature of cutaneous hyperalgesia,

itch, reactions to noxious stimuli, and pain sensation and reactions as affected by cerebral damage. In the chapter on "The Effect of Analgesic Agents upon Pain", the various modes of action of analgesics in the human subject are discussed. Finally, in an evaluation of the pain experience, the authors feel that it is desirable to separate the responses to noxious stimulation into those not dependent upon consciousness, and those involving consciousness; the former include automatic reflex responses, the latter include, on the one hand the pain sensation, and on the other hand the feeling, mood and attitude reactions largely determined by the past experience of the individual to automatic responses and to the sensation of pain. It is the interplay of these fundamental components within the individual, which comprises the experience of pain.

Despite the obvious personal nature of the pain experience, bearing as it does the stamp of individual and differentiated cultural conditioning, there are within this experience predictable aspects, which one may hope will lend themselves to investigation with quantitative techniques. This approach may take us yet another step further from the time when Sir Thomas Lewis summarized our knowledge by saying that "pain is the interpretation, which the cerebral cortex gives to incoming sensory stimuli".

MEDICAL DISORDERS OF THE LOCOMOTOR SYSTEM INCLUDING THE RHEUMATIC DISEASES

E. Fletcher, Physician in Charge of the Department of Rheumatism and Lecturer on the Rheumatic Diseases, Royal Free Hospital; Approved University Teacher, University of London. 884 pp. illust. \$11.50. E. & S. Livingstone Ltd., Edinburgh; The Macmillan Company of Canada Limited, Toronto, 1951.

It has given this reviewer considerable pleasure to review this book. As the title suggests, it is more than just a book on rheumatism and arthritis, but covers the medical aspects of all diseases of the locomotor system. The applied anatomy, pathology and physiology, as far as is known, is discussed together with such problems as pain, laboratory findings, radiology, physiotherapy, focal infection, psychiatric aspects, electromyography, etc.

The book begins with the classification of rheumatic diseases. Many chapters are devoted to different aspects of rheumatism. Such discussions as the relationship between rheumatic fever and rheumatoid arthritis, variants in the rheumatoid syndrome, the collagen diseases, the skin manifestations, etc. are masterpieces of subtle logic in this trying field of study. The chapters on osteoarthritis are particularly good. The same can also be said regarding fibrositis, that complex form of non-articular rheumatism that is regarded by some as entirely psychogenic, by Copeman as fibro-fatty herniation, and others, as strain trauma, postural faults, and what-not.

Medical diseases of bone, gout and the neuropathies receive classical attention. Special sections on sciatica, brachial neuralgia, the shoulder joint, backache and the foot, as well as peripheral vascular disorders and psychiatric aspects of the locomotor system, all add to the completeness of this volume. Cortisone and ACTH and their value in this field of diseases are discussed in general terms. A number of appendices provide detailed routines and procedures that have proved useful and can be easily followed by any practitioner. In conclusion, one can state that, here is a book that represents the best of British thought in diseases of the locomotor system. It will be used as a standard text and encyclopædia, and deserves an honoured position in every library.

BASIC MEDICAL PHYSIOLOGY

W. B. Youmans, Professor of Physiology, University of Wisconsin, Madison. 436 pp. illust. \$8.25. The Year Book Publishers Inc., Chicago; Burns & MacEachern, Toronto, 1952.

The object stated by the author in writing this book "has been to present concisely the physiologic principles forming the essential background on which to build more detailed knowledge of preclinical physiology or of clinical and pathologic physiology. Brevity has been achieved

Without Question

THE BOOK OF HEALTH

is one of the most important
books ever published

No one man could write it! The first home library of medicine complete in one book and edited by 242 of the world's most famous physicians and scientists—a fascinating treasury of medical knowledge placed at your fingertips.

Here are only a very few of the 242 leading contributors.

Sir Alexander Fleming, Penicillin Discoverer
Dr. Charles Mayo, Mayo Clinic
Dr. Charles H. Best, Toronto
Dr. James B. Collip, London
Dr. Walter C. MacKenzie, Edmonton
Dr. B. R. Webster, Montreal
Dr. Wm. R. Lovelace, Albuquerque

The Book of Health is a BIG book in every sense of the word. It weighs over five pounds. It contains 28 chapters divided into 262 sections—well over 900 pages and 1,400 illustrations. It has a 64 page glossary of medical terms and is completely cross-indexed for instant reference.

\$10.98

Order your copy now

BURNS & MacEACHERN
12 GRENVILLE ST., TORONTO 5

Announcing

Sexual Behavior in the Human Female

By

Kinsey, Pomeroy, Martin, Gebhard

and others on the Staff of Indiana University's Institute for Sex Research—

This book is a scientific study of sexual behavior in American women of various ages, educational levels, religious adherences, parental backgrounds. The material is based on data accumulated over the past 15 years in personal interviews with 5940 women; in research carried on in various areas of science; and in an exhaustive study of the literature in many fields.

Comparisons made with male behavior

The authors present data on *the incidence and frequency* with which women participate in the various types of sexual activity. Factors of age and background which modify the type and extent of activity are clearly indicated. Social significance of each type of behavior (including the woman's own reaction to her experiences) is measured wherever the data allow such a measurement. Summarized comparisons with male behavior are made throughout.

The book analyzes *the anatomic and physiologic background* of sexual response in female and in male. Included here is a considerable amount of previously unavailable material which will be of great interest and value to the physician.

Much original information is offered on the significance of *psychological factors* in sexual response—especially on their comparative importance in female and male.

Role of "sex hormones" assessed

The relation of so-called *sex hormones* to sexual response is critically re-assessed. *Neural factors* in sexual response are considered. Concepts such as *orgasm* and *frigidity* are presented in a new light.

Without question the book will prove tremendously useful to the physician in the management of the many problems of sexual maladjustment which he sees among his female patients.

By the Staff of the Institute for Sex Research, Indiana University. ALFRED C. KINSEY, WARDELL B. POMEROY, CLYDE E. MARTIN, PAUL H. GEBHARD, Research Associates; and JEAN M. BROWN, CORNELIA V. CHRISTENSON, DOROTHY COLLINS, RITCHIE G. DAVIS, WILLIAM DELLENBACK, ALICE W. FIELD, HEDWIG G. LESER, HENRY H. REMAK, ELEANOR L. ROEHR.

Consultants for all or for specialized parts of the book: JEROME CORNFELD, HAROLD DORN, ROBERT LAIDLAW, KARL LASHLEY, EMILY MUDD. Foreword by ROBERT M. YERKES and GEORGE W. CORNER, National Research Council

846 pages, 6" x 9". 151 charts; 179 tables; 4 illustrations. \$8.00.

Ready on September 14th

Ready on
September 14th

McAinsh & Co. Limited

1251 Yonge St., Toronto, 5, Ont.

Please send and charge my account

☐ 30 days

☐ Easy Payment Plan (\$3.00 per month)

☐ Kinsey, Pomeroy, Martin, Gebhard on

SEXUAL BEHAVIOR IN THE HUMAN FEMALE..... \$8.00

Name.....

Address.....

*"... this by now
justly famous
publication..."* (Medical Bulletin)

THE BRITISH ENCYCLOPAEDIA OF MEDICAL PRACTICE

Second Edition

*in Twelve Volumes,
Pharmacopoeia
Volume and Index*

The encyclopaedia that has become established as the leading reference work for Practitioners throughout the whole of the English speaking world.

*Send for details of how you can obtain
this magnificent set of books for
less than \$3.50 a month*

BUTTERWORTH & CO. (CANADA) LTD.
1367 Danforth Ave. Toronto

largely by assuming a knowledge of those subjects which are prerequisite for the study of human physiology, by restricting discussions of controversial questions and by presenting the current state of information without giving detailed evidence and without discussing the historical background." It is the opinion of this reviewer that the author has assumed too much knowledge of basic medical physiology on the part of the reader, and that the writer has restricted all too successfully the discussion of controversial questions. We would have welcomed some history on which the reader could build or add to the "essential background" of accepted principles of physiology, as well as to permit an evaluation of the controversial material which has been discussed. If an abridgement of material on principles is to be attempted, it is possible that this object might be approached by a more liberal use of text figures and tables than the few used (130 and 4 respectively). A good use of visual aids is illustrated in the author's interesting section on circulation (112 pages) wherein 50 text figures were employed. Altogether some 65 references to literature are cited. The index appears to be adequate. Cost of the book is high compared with British books on human and applied physiology.

AN OUTLINE OF GENERAL PHYSIOLOGY

*L. V. Heilbrunn, Professor of Zoology in the
University of Pennsylvania. 818 pp. \$10.50.
Illust. 3rd Edition. W. B. Saunders Company,
Philadelphia, London; McAlinsh & Co. Ltd.,
Toronto, 1952.*

Taking as his motto Pavlov's dictum, that the basis of life is in the cell, "General Physiology" means to the author—the study of the living cell. In his endeavours to solve physiological problems, the "general" physiologist has the advantage of being able to study the intricate mechanisms of life in this simplest and most rewarding material. The amazing similarity of all forms of life has been more and more recognized; what is true of the protoplasm of an amoeba, is often true also of the protoplasm of man. From a knowledge of the simpler types of living substance an interpretation of the more complex types may be attempted. The vitamins, for instance, which man needs, are in many instances needed also by insects and protozoa, by bacteria and moulds. The ability of bacteria to synthesize organic compounds from carbon dioxide and water has been shown to be shared by at least some of the tissues of higher animals.

This new edition gives full recognition to these facts. It is somewhat longer than the previous edition, but the general plan of the book is the same, except for the fact that the chapter on tropisms has been omitted. All chapters have been brought up-to-date, and in some instances the references to the literature are entirely new. "Heilbrunn" has for many years been a popular text book with students of the biological sciences, and this new edition has been timely in meeting the manifold requirements which the rapid progress of research in recent years has brought with it.

SEX MANUAL

For Those Married or About To Be

Seventh Edition, Revised. A medical best seller. Fourteen printings, half a million copies.

By G. Lombard Kelly, A.B., B.S. Med., M.D.

Ethically distributed. Sold only to physicians, medical students, nurses, pharmacies, medical bookstores or on physician's prescription. This policy strictly adhered to.

Some of the 25 chapters cover sexual lubricants, use of condom, first intercourse, frequency, positions, clitoris contact, orgasm delay by local anesthesia, impotence, climacteric, birth control, etc.

Catholic Edition, omitting birth control information, same price scale. Mixed orders, same price scale.

Paper cover, 92 pp. (35,000 words), 12 cuts. Single copies, \$1.00; 2 to 9 copies, 75c ea.; 10 to 24 copies, 70c ea.; 25 to 49 copies, 60c ea.; 50 to 99 copies, 50c ea.; 100 or more, 45c ea. POSTPAID.

Terms: REMITTANCE WITH ORDER; NO COD's. Descriptive folder on request.

SOUTHERN MEDICAL SUPPLY CO.

P.O. Box C-1168

Augusta, Ga.

Books Received

Books are acknowledged as received, but in some cases reviews will also be made in later issues.

The Incidence of Peptic Ulcer in Denmark. G. Alsted, Privat-Docent at the University of Copenhagen; Director of Health Bureau, League of Red Cross Societies, Geneva. 88 pp. \$2.25. Danish Science Press, Ltd., Copenhagen, 1953.

Influenza and Other Virus Infections of The Respiratory Tract. C. H. Stuart-Harris, Professor of Medicine, University of Sheffield, 235 pp., illust. \$5.75. Edward Arnold & Co., London; The Macmillan Co. of Canada Ltd., Toronto, 1953.

Sympathetic Control of Human Blood Vessels. H. Barcroft, Professor Physiology, St. Thomas's Hospital Medical School London; and H. J. C. Swan, Formerly Lecturer in Physiology, St. Thomas's Hospital Medical School, London. 165 pp., illust. \$3.50. Edward Arnold & Co., London; The Macmillan Co. of Canada Ltd., Toronto, 1953.

Diseases of Children. Edited by A. Moncrieff, Nuffield, Professor of Child Health, University of London; and P. Evans, Physician to the Children's Department and Director of the Department of Child Health. Vol. I and Vol. II, 1,973 pp., illust., 4th ed. \$26.50 per set. Edward Arnold & Co., London; The Macmillan Co. of Canada Ltd., Toronto, 1953.

A Modern Practice of Obstetrics. D. M. Stern, Obstetric and Gynaecological Surgeon, West Middlesex Hospital and its annexes; and C. W. F. Burnett, Obstetric and Gynaecological Surgeon, West Middlesex Hospital and its annexes. 248 pp., illust. \$6.75. Baillière, Tindall & Cox, London WC2; The Macmillan Co. of Canada Ltd., Toronto 2, 1952.

Malaria Terminology. World Health Organization: Monograph Series, No. 13. 82 pp. Price \$1.00, Fr. fr. 320.-, Sw. fr. 4.-. World Health Organization, Palais des Nations, Geneva, 1953.

Kielland's Forceps. E. Parry Jones, Consultant Obstetrician and Gynaecologist, St. Asaph General and Maternity Hospitals; Late Registrar, Liverpool Maternity Hospital; and Obstetric Tutor, Liverpool University. 212 pp., illust. 35s. Butterworth & Co. (Canada) Ltd., Toronto, 1952.

Problems of Infancy and Childhood. Edited by M. J. E. Senn, Sterling Professor of Pediatrics and Psychiatry, Yale University School of Medicine, New Haven, Conn. 160 pp. \$2.50. Josiah Macy, Jr. Foundation, New York 36, N.Y. 1953.

Modern Treatment. Edited by A. Smith, Editor of the Journal of the American Medical Association; and P. L. Wermer, Secretary, Committee on Research, American Medical Association. 1,146 pp. \$20.00. Paul B. Hoeber, Inc., New York, 1953.

Polyglot Medical Questionnaire. S. Chalmers Parry, Fellow of the Society of Medical Officers of Health, Member of the Royal Sanitary Institute. 62 pp. 12/6d. H. K. Lewis & Co. Ltd., London, 1953.

Epidemiology and Control of Endemic Syphilis. Monograph Series No. 11. Report on Mass-Treatment Campaign in Bosnia. E. I. Grin, Director, Central Dispensary for Skin and Venereal Diseases, Sarajevo, Yugoslavia. 93 pp., illust. \$1.00, 5/-, Sw. fr. 4.-. World Health Organization, Palais des Nations, Geneva, 1953.

Guide for National Studies of Nursing Resources. M. G. Arnstein, Chief, Division of Nursing Resources, United States Public Health Service; Nursing Consultant, World Health Organization. 36 pp. \$0.20, Fr. fr. 60.-, Sw. fr. \$0.75. World Health Organization, Palais des Nations, Geneva, 1953.

Encyclopedia of Aberrations. Edited by E. Podolsky, State University of New York Medical College. 550 pp. \$10.00. Philosophical Library Inc. New York.

A Guide to Obstetrics in General Practice. W. C. W. Nixon, Professor of Obstetrics and Gynaecology, University of London; and E. B. Hickson, Chairman, Wiltshire Local Obstetric Committee. 301 pp., illust. Price: 30s. Staples Press Ltd., London, 1953.

The Psychopathic Delinquent and Criminal. G. N. Thompson, Associate Clinical Professor of Neurology and Psychiatry, School of Medicine, University of Southern California, Los Angeles, California. 157 pp., illust. \$5.00. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

Hypnosis in Modern Medicine. Edited by J. M. Schneck, Clinical Associate in Psychiatry, College of Medicine, State University of New York; Psychiatric Consultant, Westchester County Department of Health (N.Y.). 323 pp. \$8.25. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

Treatment of Respiratory Emergencies Including Bulbar Poliomyelitis. T. C. Galloway, Professor Emeritus of Otolaryngology, Northwestern University Medical School, Attending Otolaryngologist, Evanston Hospital, Evanston, Illinois. 94 pp., illust. \$3.50. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

The Wechsler-Bellevue Scales: A Guide for Counselors. C. H. Patterson. 146 pp. \$4.25. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

Meniere's Disease. H. L. Williams, Head of Section of Otolaryngology and Rhinology, Mayo Clinic; Professor of Otolaryngology and Rhinology, Mayo Foundation. 349 pp., illust. \$8.00. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1952.

Continued on page 40

COMPRESSION ARTHRODESIS

by John Charnley, F.R.C.S., Consultant Orthopaedic Surgeon to Manchester Royal Infirmary.

276 pages, 208 illustrations. 1953. \$7.15

From his wide experience, the author presents techniques for compression arthrodesis of the knee, ankle, shoulder and hip.

DISEASES OF THE LIVER, GALLBLADDER AND BILE DUCTS

by S. S. Lichtman, M.D., F.A.C.P., Assistant Professor of Clinical Medicine, Cornell University Medical College.

Third Edition, 1953. 2 Volumes. 220 illustrations, 1315 pages. Complete index in both volumes. Per set \$22.00.

A major revision of a standard work in the field. Diagnostic procedures are fully outlined and there is a wealth of authoritative information on differential diagnosis and treatment.

THE MACMILLAN COMPANY OF CANADA LIMITED
70 Bond Street • Toronto 2, Ontario



SHOULDER LESIONS

By H. F. Moseley, McGill University, Montreal. The second edition of this valuable book contains two new chapters: Fractures in the Shoulder Region, and The Clavicular Articulations; also considerable revision. 345 pages, 259 illustrations (43 in full colour), second edition, 1953. \$13.25.

MODERN TREATMENT

Edited by Austin Smith, Editor, *Journal of the American Medical Association*, and Paul L. Wermer, Secretary, Committee on Research, American Medical Association. A guide for general practice. Fifty-three postgraduate teachers present the practical essentials of today's therapy. 1164 pages, 1953. \$22.00.

TUMORS OF BONE

By Bradley L. Coley and Norman L. Higinbotham, both of Cornell University Medical College. A roentgenographic atlas. Vol. XXI, Annals of Roentgenology. Reproductions of roentgenograms of representative cases of benign and malignant neoplasms and associated skeletal lesions, for the roentgenologist, oncologist and orthopedic surgeon. 224 pages, 172 figures, 1953. \$11.00.

Write for our Catalogue of Medical Books
THE RYERSON PRESS
TORONTO

JOURNAL OF

Canadian Medical Association

Editorial offices — 3640 University St., Montreal 2
General Secretary's office—135 St. Clair Ave. W., Toronto

Subscription rates: The Journal is supplied only to paid up members of the Canadian Medical Association with the following exceptions: for medical libraries, hospitals and doctors residing outside of Canada, the annual subscription is \$10.00; for medical students residing in Canada there is a special rate of \$2.50 per annum. All subscriptions and related correspondence should be addressed to the General Secretary's office at 135 St. Clair Avenue West, Toronto 5, Ontario.

Contributors: Articles are accepted on condition that they are contributed solely to this Journal. Material contributed to this Journal is covered by copyright, and permission must be obtained for its reproduction either in part or in whole.

Manuscripts must be typewritten, double spaced, and the original copy.

Papers should be kept below 4,000 words wherever possible. Whilst not necessarily a cause for rejection, excessive length of an article is undesirable.

References: in the case of a journal arrange as follows: author (JONES, A. B.), title, journal, volume, page, year. In the case of a book: WILSON, A., Practice of Medicine, Macmillan, London, 1st ed., p. 120, 1922.

Illustrations: A limited number will be accepted. Photographs should be clear: drawings should be in india ink on white paper. All unmounted. Legends to be typed separately.

Reprints: May be ordered upon forms sent with galley proofs.

News: The Editor will be glad to consider any items of news that may be sent in by readers.

CLASSIFIED ADVERTISEMENTS

Send copy to Canadian Medical Association, 3640 University Street, Montreal, not later than the fifteenth of the month previous to issue.

Rates: \$3.00 for each insertion of 40 words or less, additional words 5c each.

If a box number is requested, there will be an additional charge of 50c on the first advertisement to cover postage and handling charges.

FOR SALE.—Doctor's residence and office in western Ontario town. Forced to sell because of ill health. Apply to Box 704, Canadian Medical Association Journal, 3640 University Street, Montreal, P.Q.

FOR SALE.—All electric model (Hindle) electrocardiograph (manufactured by Cambridge Instrument Company) No. 0-11137, completely overhauled and not used since. Apply to Box 703, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

FOR SALE.—Excellent office and home in thriving oil town. Equipped with modern x-ray and fixtures. Ideal for recent graduate, single man, Ukrainian speaking. Terms can be arranged. Apply to Box 100, Redwater, Alberta.

FOR SALE.—Long established general medical practice in South Western Ontario. Well equipped office. Excellent hospital in town. Illness forces retirement. Apply to Box 674, Canadian Medical Association Journal, 3640 University Street, Montreal, P.Q.

FOR SALE.—Well established practice in central Alberta town, on main highway. Excellent 3-bedroom home with automatic forced air gas furnace, completely insulated and newly decorated, situated on double corner lot. Modern 25-bed hospital with well equipped laboratory, x-ray and operating rooms offers good surgical scope. Town has mains, water sewage etc., golf course and indoor arena. Practice receipts well above average. Price very reasonable. Apply to Box 702, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

FOR SALE.—Doctor, recently specialized, wishes to sell his general practice surgical and office instruments etc. Reply to Box 708, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

NOTICE.—FELLOWSHIP IN CLINICAL INVESTIGATION. Applications are invited before December 1, 1953, for the Fellowship in Clinical Investigation. Tenure 12 months from July 1, 1954. Value \$3,000. No board or residence. Applicants should have at least 2 years postgraduate training or internship. Preference given to those having training in pathology or clinical sciences. Address: Secretary, Medical Board, Vancouver General Hospital, Vancouver 9, B.C.

POSITION WANTED.—Certified otolaryngologist requires association with ophthalmologist in western Canadian city. Reply to Box 709, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

POSITION WANTED.—Young woman, 27, requires post as nursery-governess. Willing to help with domestic duties. Educated in England and Europe. Varied experience. Montreal preferred. Reply to Box 707, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

POSITION WANTED.—Certified general surgeon, 41, desires to join a group or senior surgeon with a view to partnership. Experience in surgical and general work. Willing to do general practice, besides surgery, if necessary. Testimonials available. Reply to Box 694, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

POSITION WANTED.—German otolaryngologist, English speaking, age 33, protestant, 3 years training in specialty Berlin University, completing rotating internship and writing L.M.C.C. this October, thereafter seeks assistantship with certified otolaryngologist. Own instruments, adaptable, good references. Reply to Box 695, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

POSITION WANTED.—Dublin graduate M.B., D.A., 28, single, 18 months surgery, 6 months medicine, 12 months general practice and obstetrics, 2 years training all branches anaesthesia with diploma, seeks position in general practice with part time anaesthetic work. Reply to Box 696, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

POSITION WANTED.—In association with clinic or industry, preferably B.C., southern Ontario or B.W.I., by McGill graduate (1945). Certified in internal medicine; has held residencies in Boston, Montreal, and some industrial experience. Single, age 32. Reply to Box 686, Canadian Medical Association Journal, 3640 University Street, Montreal, Que.

Continued on Page 36

'My Bank'
is
Canada's
First Bank



**BANK OF
MONTREAL**

WORKING WITH CANADIANS IN EVERY WALK OF LIFE SINCE 1817

**POSTGRADUATE DIVISION
TUFTS COLLEGE MEDICAL SCHOOL**
REVIEW OF RECENT ADVANCES IN INTERNAL MEDICINE
October 5-10, 1953

This is a refresher course designed to review the latest developments in Internal Medicine for general practitioners and internists with special emphasis upon proved diagnostic and therapeutic methods and discussion of fundamental concepts underlying these. There are formal lectures, panel discussions, and clinics and adequate time for informal discussion and question periods is provided. Teaching is conducted largely by members of the staff of the Pratt Diagnostic Clinic-New England Center Hospital, under the direction of Robert P. McCombs, M.D., but authorities from elsewhere are invited to participate when appropriate. Some of the topics that are given special emphasis are: hypertension, heart failure, indications for surgical therapy of heart disease, electrolyte imbalance, hemolytic anemias, hemorrhagic diseases, chemotherapy of leukemias and lymphomas, present status of therapy of other malignant diseases, the collagen diseases, newer antibiotics, and diagnosis and therapy in endocrinopathies. Tuition fee: \$50.

Application for enrollment should be made to:
Postgraduate Courses
30 Bennet Street, Boston 11, Mass.



**University of Toronto
SCHOOL of HYGIENE**

**Diploma in
Public Health**

The next course
will commence on
September 21, 1953.

For information regarding this course and the
DIPLOMA IN HOSPITAL ADMINISTRATION

write, The Director, School of Hygiene,
University of Toronto, Toronto, Ontario

McGILL UNIVERSITY TEACHING HOSPITALS
RESIDENCY IN OTOLARYNGOLOGY

ROYAL VICTORIA HOSPITAL
MONTREAL GENERAL HOSPITAL
CHILDREN'S MEMORIAL HOSPITAL

A three-year training in Otolaryngology is offered which is designed to qualify the trainee for the examinations of Certification or Fellowship of the Royal College of Surgeons of Canada and for the examinations of the American Board of Otolaryngology, all three of which demand a minimum of three years special training.

An additional year in Research and an approved thesis would fulfil the major requirements of the McGill Diploma in Otolaryngology and of the Master of Science Degree.

Candidates must be graduates of a Grade A Medical School and have a minimum of one year's general Internship. Preference will be given those candidates who have had at least one additional year of Internship in General Surgery or Internal Medicine.

The course consists of a rotation through three teaching hospitals of McGill University, viz. the Royal Victoria, the Montreal General and the Children's Memorial Hospitals. Included in the course is a four months full time period in General Pathology with special emphasis on the Pathology of the Ears, Nose and Throat.

During the academic session there are bi-weekly lectures on the applicable basic sciences and on the associated and pertinent clinical subjects. A course in the Anatomy of the Head and Neck for Otolaryngologists is conducted annually in the Department of Anatomy.

Laboratory facilities are available for dissection of temporal bones, etc., and for histopathological study. There is a departmental library of current special journals and reference text books.

The participating hospitals have active Outdoor Clinics from which a wealth of clinical material is drawn. The Residents are under direct supervision of the members of the visiting staff who are at their disposal at all times for instruction and guidance.

The hospital year extends from July 1st to June 30th of the following year.

Applications should be addressed to the Chairman of the Department of Otolaryngology, McGill University, Montreal.

THE NEW YORK POLYCLINIC
MEDICAL SCHOOL and HOSPITAL

(ORGANIZED 1881)

(The Pioneer Post-Graduate Medical Institution in America)

OBSTETRICS and GYNECOLOGY

A full time course. In obstetrics: lectures; prenatal clinics; witnessing normal and operative deliveries; operative obstetrics (manikin). In gynecology: lectures; touch clinics; witnessing operations; examination of patients pre-operatively; follow-up in wards post-operatively. Obstetrical and gynecological pathology. Anesthesia. Attendance at conferences in obstetrics and gynecology. Operative gynecology on the cadaver.

RADIOLOGY

A comprehensive review of the physics and higher mathematics involved, film interpretation, all standard general roentgen diagnostic procedures, methods of application and doses of radiation therapy, both x-ray and radium, standard and special fluoroscopic procedures. A review of dermatological lesions and tumors susceptible to roentgen therapy is given, together with methods and dosage calculation of treatments. Special attention is given to the newer diagnostic methods associated with the employment of contrast media, such as bronchography with Lipiodol, uterosalpingography, visualization of cardiac chambers, peri-renal insufflation and myelography. Discussions covering roentgen departmental management are also included; attendance at departmental and general conferences.

**PROCTOLOGY and
GASTROENTEROLOGY**

A combined course comprising attendance at clinics and lectures; instruction in examination, diagnosis and treatment; witnessing operations; ward rounds; demonstration of cases; pathology; radiology; anatomy; operative proctology on the cadaver; attendance at departmental and general conferences.

ANATOMY — SURGICAL

1. ANATOMY COURSE for those interested in preparing for Board Examinations. This includes lectures and demonstrations together with supervised dissection on the cadaver.

2. SURGICAL ANATOMY for those interested in a general Refresher Course. This includes lectures with demonstrations on the dissected cadaver. Practical anatomical application is emphasized.

3. OPERATIVE SURGERY (CADAVER). Lectures on applied anatomy and surgical technic of operative procedures. Matriculants perform operative procedures on cadaver under supervision.

For Information about these and other courses ADDRESS:

THE DEAN, 345 West 50th Street, New York 19, N. Y.

A REFRESHER COURSE IN PAEDIATRICS FOR GENERAL PRACTITIONERS

September 21 - 25, 1953

at

THE HOSPITAL FOR SICK CHILDREN ST. JUSTINE OF MONTREAL

(incorporated 1908)

On modern methods in paediatrics applicable in private practice, with special emphasis on the diseases of infancy; hematology, endocrinology, neuropsychiatry, O.R.L. and ophthalmology, as related to children; laboratory and therapeutic procedures.

Courses: One week—September 21 to 25, inclusive.

9:00 a.m. to 12:00 noon—Lectures and Presentation of cases.

2:00 p.m. to 5:00 p.m.—Demonstration of pediatric technics.

Lectures followed by practical demonstrations and bedside clinics.

Limited registration—to allow individual clinical examinations and therapeutic technics.

A certificate, regularly inscribed, granted to doctors at the end of the course.

Registration Fee—\$5.00

For application and information write to:

Dr. Edouard LABERGE
Post-Graduate Courses
St. Justine's Hospital for Children
6055 St. Denis Street
Montreal 10, Quebec.

NEW YORK UNIVERSITY POST-GRADUATE MEDICAL SCHOOL

477 FIRST AVENUE, NEW YORK 16, N.Y.

Department of Obstetrics and Gynecology

SEMINAR IN GYNECOLOGY

4 weeks, full time. October 5 through 31, 1953

Department of Neurosurgery

THE INTERVERTEBRAL DISC

5 days, full-time. October 5 through 9, 1953

Department of Pediatrics

CLINICAL PEDIATRICS

4 weeks, full-time. October 5 through 30, 1953

Department of Medicine

GASTROENTEROLOGY

5 days, full-time. October 12 through 16, 1953

ELECTROCARDIOGRAPHY FOR ANESTHESIOLOGISTS

5 days, full-time. October 12 through 16, 1953

NEPHRITIS AND HYPERTENSION

5 days, full-time. October 26 through 30, 1953

ALLERGY

2 weeks, full-time. November 9 through 20, 1953

ARTHRITIS AND ALLIED RHEUMATIC DISORDERS

1 week, full-time. November 9 through 13, 1953

Department of Physical Medicine and Rehabilitation

SEMINAR ON THE REHABILITATION OF CHILDREN

5 days, full-time. October 19 through 23, 1953

Department of Otorhinolaryngology

NEUROANATOMY, NEUROPHYSIOLOGY, AND NEURO-ANATOMY

5 days, full-time. November 2 through 6, 1953

RHINOLOGY, SINUS AND NASAL SURGERY

5 days, full-time. December 7 through 11, 1953

For application and additional information
about these and other courses, address:

Office of the Dean, Post-Graduate Medical School

(A Unit of the New York University-Bellevue Medical Center)

Books Received

On Burns. Edited by N. A. Womack. 178 pp. \$6.00. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

Amebiasis. H. H. Anderson, Professor and Chairman, Pharmacology and Experimental Therapeutics, The School of Medicine, University of California Medical Centre, San Francisco, California; W. L. Bostick, Associate Professor of Pathology, Department of Pathology, The School of Medicine, University of California Medical Centre, San Francisco, California; H. G. Johnstone, Professor of Parasitology, Parasitology and Mycology Section of the Department of Medicine, University of California Medical Centre, San Francisco, California. 431 pp., illust. \$12.75. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

Pathology of the Heart. Edited by S. E. Gould, Clinical Professor of Pathology, Wayne University College of Medicine, Detroit, Michigan; Pathologist, Wayne County General Hospital, Eloise, Michigan. 1023 pp., illust. \$28.00. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

Hypersplenism and Surgery of the Spleen. W. Dameshek and C. S. Welch. 84 pp., illust. \$11.00. Grune & Stratton, Inc., New York; The Ryerson Press, Toronto, 1953.

Stress and Disease. H. G. Wolff, Professor of Medicine (Neurology), Cornell University Medical College; Attending Physician, New York Hospital, New York, N.Y. 199 pp., illust. \$5.50. Charles C. Thomas, Springfield, Illinois; The Ryerson Press, Toronto, 1953.

Adjustment to Physical Handicap and Illness: A Survey of the Social Psychology of Physique and Disability. R. G. Barker. Bulletin 55 (Revised), 440 pp., illust. \$2.00. Social Science Research Council, New York 17, N.Y., 1953.

Medicine, Essentials for Practitioners and Students. G. E. Beaumont, Physician to the Middlesex Hospital; Physician to the Hospital for Consumption and Diseases of the Chest, Brompton. 831 pp., illust., 6th ed. \$7.50. J. & A. Churchill Ltd., London; British Book Service (Canada) Ltd., Toronto, 1953.

Gout and Gouty Arthritis. Modern Medical Monographs No. 7. J. H. Talbott, Professor of Medicine, The University of Buffalo School of Medicine; Physician in Chief, Buffalo General Hospital, Buffalo, N.Y. 92 pp., illust. \$4.50. Grune & Stratton, New York; The Ryerson Press, Toronto, 1953.

Chronic Pulmonary Emphysema. Modern Medical Monographs No. 8. M. S. Segal, Clinical Professor of Medicine, Tufts College Medical School; and M. J. Dulfano, Resident, Department of Inhalational Therapy, Boston City Hospital. 180 pp., illust. \$6.00. Grune & Stratton, New York; The Ryerson Press, Toronto, 1953.

Background to Hospital Planning. H. W. C. Vines, Professor of Pathology, University of London, and Pathologist to Charing Cross Hospital. 188 pp., illust. \$6.00. Faber & Faber Ltd., London; British Book Service (Canada) Ltd., Toronto, 1952.

Radiations and Living Cells. F. G. Spear, Member, Scientific Staff, Medical Research Council, Strangeways Research Laboratory, Cambridge. 222 pp., illust. \$4.00. Chapman & Hall Ltd., London; British Book Service (Canada) Ltd., Toronto, 1953.

Chemical Induction of Cancer. G. Wolf, Assistant Professor, University of Illinois. 250 pp., illust. \$4.00. Cassell & Co. Ltd., London; British Book Service (Canada) Ltd., Toronto, 1952.

Residential Speech Therapy. Edited by C. Worster-Drought. 150 pp., illust. \$3.50. William Heinemann Medical Books Ltd., London; British Book Service (Canada) Ltd., Toronto, 1952.

Fibrocystic Disease of the Pancreas. Edited by M. Bodian, Director of the Department of Morbid Anatomy, The Hospital for Sick Children, London. 244 pp., illust. \$12.75. William Heinemann Medical Books Ltd., London; British Book Service (Canada) Ltd., Toronto, 1952.

Physiological Foundations of Neurology and Psychiatry. E. Gellhorn. Professor of Neurophysiology, University of Minnesota. 556 pp., illust. \$9.25. The University of Minnesota Press, Minneapolis; Thomas Allen Ltd., Toronto, 1953.

A NEW MEDICAL BUILDING IN TORONTO

A modern, air conditioned, 15-suite doctor's office building is being erected on Bloor St. W., at Palmerston Blvd., approximately 605 Bloor St. W., Toronto.

Occupation September 15th.

Parking space provided.

If you are interested, please phone Toronto
KE. 2182 or RI. 6767



Fig. 1: "Roentgen examination . . . revealed the ulcer to be very much in evidence."



Fig. 2: In ten weeks "the ulcer niche was no longer in evidence roentgenologically or gastroscopically."

Clinical Evaluation of Pro-Banthine®

CASE REPORT

"M. D., female, aged 48, had a posterior gastrojejunostomy 14 years ago for duodenal ulcer. The patient was fairly well until nine months ago when severe, intractable pains occurred. She was hospitalized and a subtotal gastrectomy was done.

"She remained well for only a few months and was referred to us because of recurrence of very severe pain and marked weight loss. Roentgen study revealed a fairly large ulcer niche on the gastric side of the anastomosis.

"The patient had been on various types of antacids and sedatives without relief from pain. She was given 60 mg. of Pro-Banthine q.i.d. and within 72 hours was able to sleep through the night for the first time in weeks.

"At the end of two weeks of such treatment the patient had absolutely no pain and felt that she had been 'cured.' Roentgen examination at this time revealed the ulcer to be very much in evidence (Fig. 1). Much persuasion was necessary to make the patient realize the importance of maintaining her diet and therapy.

"Ten weeks of controlled regulation was necessary before we were satisfied that the ulcer niche was no longer in evidence roentgenologically or gastroscopically (Fig. 2).

"She has been maintained on 30 mg. [q. i. d.] of Pro-Banthine for almost five months with no recurrence of symptoms."

Schwartz, I. R.; Lehman, E.; Ostrove, R., and Seibel, J. M.: A Clinical Evaluation of a New Anticholinergic Drug, Pro-Banthine, to be published.

Pro-Banthine (brand of *propanthelinebromide*), the new, improved anticholinergic agent, is more potent and, consequently, a smaller dosage is required and side effects are greatly reduced or absent.

Peptic ulcer, gastritis, intestinal hypermotility, pancreatitis, genitourinary spasm and hyperhidrosis respond effectively to Pro-Banthine, orally, combined with dietary regulation and mental relaxation.

SEARLE Research in the Service of Medicine

G. D. **SEARLE** & CO. OF CANADA, LTD., 390 Weston Road, Toronto 9, Ontario

Thirty Years Ago . . .

From the *Journal* of September, 1923

EDITORIAL COMMENT—Help for Medical Men in Russia.

"An earnest effort is being made by the Medical Division of the American Friends Service Committee (Quakers) to collect money, clothing, instruments, books and journals for the benefit of the medical profession in Russia. We are in receipt of a letter from a well known professor in Johns Hopkins University, requesting a personal effort from every physician who has it in his power to aid these confrères. He writes that the condition of these men is deplorable. Removed happily to a great extent by the nature of their profession from the political disturbances of the past six years, they have suffered doubly. While the demands for assistance have multiplied greatly, they have been deprived, not only of the bare necessities of life, but are in dire need of drugs, medical and surgical instruments, and of good medical literature. The Quakers assert that they are in a position to assure the American profession that contributions will be promptly and efficiently distributed where it will do most good. The writer ends his personal letter by stating: 'It is not a charity; it is a duty.' The Quaker relief workers will directly supervise the distribution."

Extracts from Report of Executive Committee.

"It is with deepest regret that we record the loss by death on May 20 of our late esteemed Secretary-Treasurer, Dr. J. W. Scane. Though confined to hospital and suffering a great deal during his last eight months, he was constantly desirous of rendering what help he could to the Association and his wise counsel and advice were of material assistance to his associates in the carrying on of the work. By his death the Association has lost a valuable officer, the medical profession a worthy representative, and those of us who were privileged to know him, an esteemed and staunch friend."

GENERAL NEWS

"According to arrangements which are absolutely unique in the history of the Canadian Medical Association, Dr. F. J. Tees, of Montreal, lecturer in Clinical Surgery at McGill University, Dr. F. W. Marlow, Associate Professor of Gynæ-

cology, University of Toronto, and Dr. T. C. Routley, the newly elected General Secretary of the Canadian Medical Association, met in Victoria, B.C., on July 3, to address the Victoria Medical Society. The group then proceeded to Vancouver and other cities of the West." . . . "In addition to his lecture, Dr. Marlow took the opportunity in the various cities of discussing with the men the pros and cons of the formation of a Canadian College of Physicians and Surgeons. From the point of view of attendance at the meetings, enthusiasm, cordiality, harmony, and a most generally expressed desire in all parts of the West for the furtherance of all efforts which might be calculated to build up a strong national organization of the profession, it was very evident that the Association has a very important and useful part to play in the lives of the practitioners of medicine in Canada."

Extract from Report of Treasurer.

. . . . "Over 500 have dropped their membership. It is of interest to note that the reason for resignation given by the large majority was the excessive fee charged by the Provincial Associations which, it was the contention, made it impossible to carry on membership in both organizations. New members added to the books numbered 291."

"Receipts from advertising amounted to \$16,860.02, showing an increase over 1921 of \$5,633.71. Although this is an excellent showing and more than paid for the actual printing of the *Journal*, it was not sufficient to cover all additional expenses connected with the *Journal*, such as Agents' commission, the cost of illustrations and the allowance to the Editorial Board. Towards the end of 1922 a reluctance on the part of new advertising firms to take space in our *Journal* was noticeable. Investigation showing this to be due to our high charges for advertising and to a comparatively small circulation, your Committee considered an immediate remedy advisable. Consequently, commencing January, 1923, the advertising rates were lowered from ten per cent to twenty per cent. The question of circulation, however, was a more serious one, and after due consideration, a proposition from the President of the Ontario Medical Association was approved and accepted. This, in short, was to the effect that the *Journal* should be sent free for one year to about 1,000 members of the Ontario Medical Association, who are not members of the Canadian Medical Association, the cost to be borne equally by the Canadian and Ontario Medical Associations."

Dilaudid hydrochloride

(brand of dihydromorphine hydrochloride)

COUNCIL ACCEPTED



● Dilaudid, T. M. Reg. Canada

Powerful opiate analgesic - dose, 1/32 grain to 1/20 grain.

Potent cough sedative - dose, 1/128 grain to 1/64 grain.

Readily soluble, quick acting.

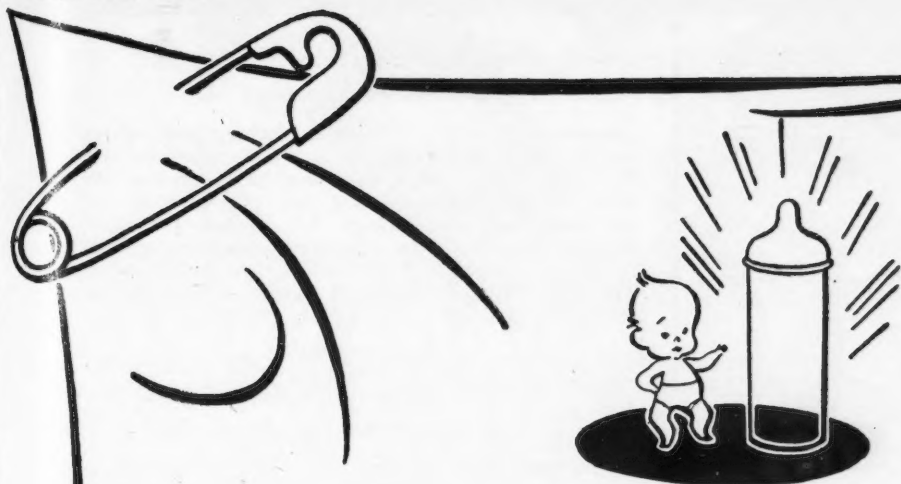
Side effects, such as nausea and constipation, seem less likely to occur.

An opiate, has addictive properties.

Dependable for relief of pain and cough, not administered for hypnosis.

Product of Bilhuber-Knoll Corp., Orange, N. J.

MERCK & CO. Ltd. Selling Agents 560 De Courcelles St., MONTREAL



Rx When Lactation Fails **LACTOGEN[®]**

When the supply of breast milk is inadequate or when lactation fails entirely, there is no better formula than Lactogen. Designed to resemble mother's milk, it consists of whole cow's milk modified with milk fat and milk sugar. It differs, however, in one important respect: the protein content of Lactogen in normal dilution is one-third greater than that of mother's milk—2.0% instead of 1.5%.

A Complete Infant Formula In One Package

Lactogen contains all the ingredients of a well-balanced infant formula.

Easily Prepared... Merely Add Water

Lactogen is simple to use. The prescribed amount is stirred into warm, previously boiled water. Either a single feeding can be prepared, or the entire day's quantity can be made up and stored in the refrigerator until used.

NESTLÉ (CANADA) LTD., Toronto, Ont.



**NOTABLY HIGH IN
PROTEIN CONTENT**

Lactogen contains a generous amount of protein... more than enough to satisfy every protein need of the rapidly growing infant.



THE ALLERGIC WOMAN

Since allergic women are sensitive to many substances, cosmetics must be considered a primary or contributory cause of the patient's discomfort. That is why physicians have prescribed Marcelle Hypo-Allergenic Cosmetics for almost 20 years. In prescribing Marcelle, the cosmetic is minimized as an etiologic factor.

Marcelle,® the Original Hypo-Allergenic Cosmetics, are based upon the dynamic concept of continuous laboratory and clinical research . . . to minimize the incidence of cosmetic sensitivity. Marcelle is the first line of cosmetics accepted by the Committee on Cosmetics of the A.M.A. They are moderately priced for your patients.

MARCELLE COSMETICS, INC., CHICAGO 47, ILLINOIS

Literature and samples available by writing:
Canadian Distributors

PROFESSIONAL SALES CORP.

1434 St. Catherine Street, West • Montreal, Canada



SAFE COSMETICS FOR SENSITIVE AND ALLERGIC SKINS

NEWS AND NOTES

(Continued from page 342)

preventive measures, by better clothing and equipment, and by improved techniques in the management of cases. Protective and sanitary measures have reduced the toll from the epidemic diseases, not only among military personnel but also among the civilian population of Korea. Altogether, the advances made through experience and research in safeguarding the health and life of our armed forces during the Korean War add a new chapter to the history of military medicine."

A HUB OF FRIENDLY EMPIRE

(Reprinted in part from *Punch*, Sept. 3, 1952.)

"It seems to have taken up a long time to grasp the simple fact that London, in size and habit a forbidding place to any stranger, is doubly lonely for students from the Dominions and Colonies, who come to it with the promise of the same language but with all their friendships still to make. The various Empire societies have done a great deal to fill the social gap, but there remain the important problems of decent accommodation and of helping the student to take the easiest and most profitable path towards whichever academic goal he has chosen. . . . Up to 1930 his well-being as a whole was nobody's business.

"In that year two men felt so strongly that by this neglect of our elementary duties as hosts we were wasting golden opportunities for Empire goodwill that they decided to take action. One was the late Mr. F. C. Goodenough, the other Mr. L. S. Amery . . . London House was begun and one-third finished when it was opened by Queen Mary in 1937. Further construction since the war and now in process of completion will leave it three-quarters finished. Present lack of money seems to put the fourth quarter some way into the future, but when it takes final shape London House will be one of the most impressive new buildings in Great Britain. . . .

"Staffed mainly by an enthusiastic team of senior officers retired from the Army, London House now has on its books about two hundred and fifty resident students, and ultimately it will have room for three hundred. They come mostly from all the countries of the Empire, but there is also a small number of American and British, for one of the aims of the foundation is to bring English-speaking people together from as wide a front as possible. . . .

"London House has been called 'neither a club, nor a hostel, nor a college, but a little of all three'. Apart from the ordinary code of corporate manners, it prides itself on being free from rules. In return for a reasonable sum (which varies with different rooms, and whether they are shared) a student is well fed, well housed, and given the run of such amenities as a useful library, peaceful reading rooms, a bar and a music room; in time these will include squash courts and a swimming bath. . . .

"Although London House is closely connected with the Nuffield Foundation, from which it originally received a generous grant, there is no financial link. It is by no means well off, and it is hoped that with better understanding of its service Empire donations will increase. The constant problem of its Trustees is to fill an annual gap by public subscription. If the House were self-supporting in the face of ever rising costs it would have to raise its fees to a point where many of its students would be driven back to the landlady and the gas-ring. And to avoid that is the prime reason for its existence."

ERIC KEOWN

CHORLEY PARK DEPOT TO COLLECT BLOOD FOR GAMMA GLOBULIN

The federal government has announced further steps to obtain for 1954 a supply of blood for increased production of gamma globulin, the recently-discovered substance used to modify the effects of paralysis in poliomyelitis. A grant of more than \$157,000 has been allotted to keep in operation the Chorley Park blood

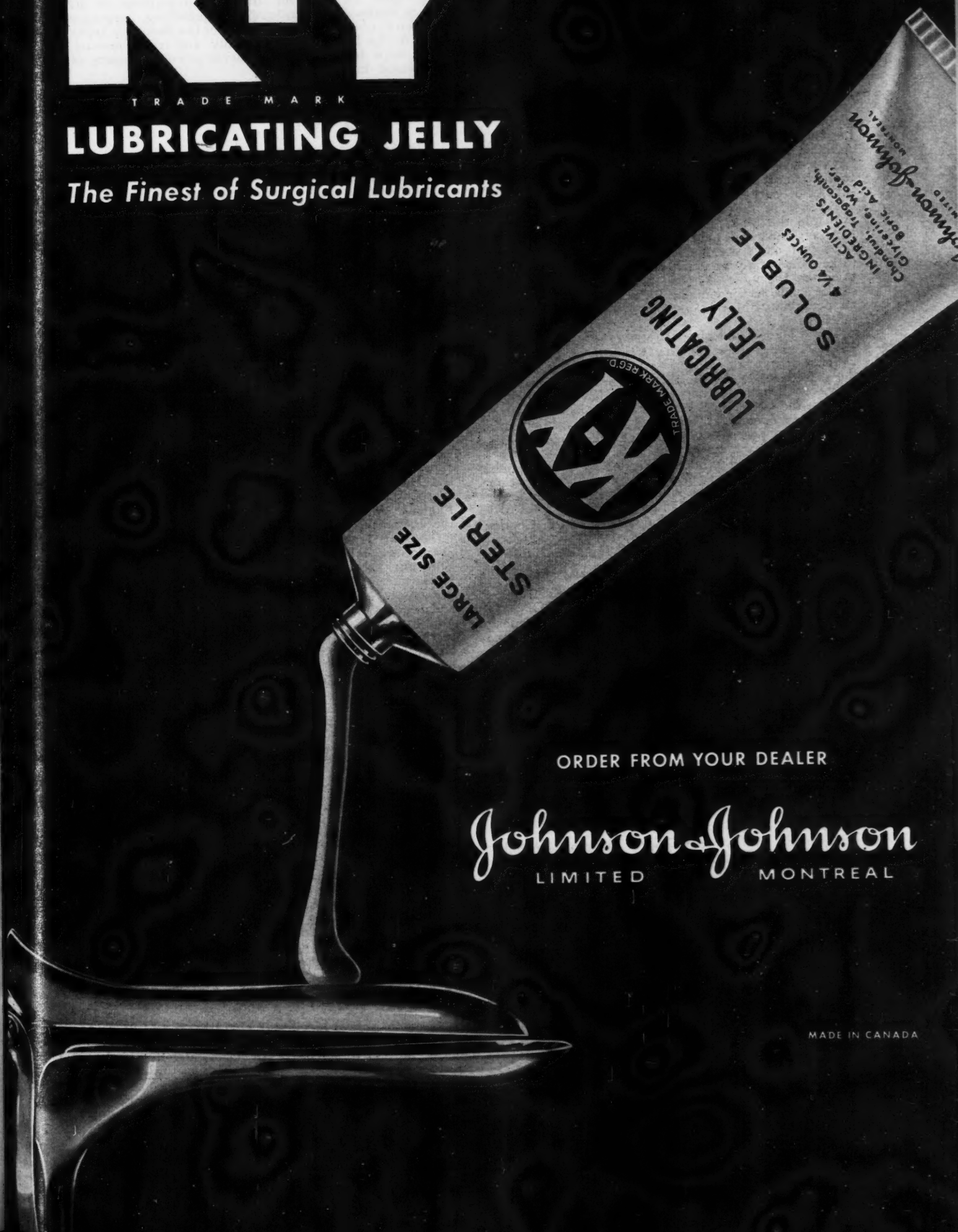
(Continued on page 74 of the advertising section)

K-Y

TRADE MARK

LUBRICATING JELLY

The Finest of Surgical Lubricants



ORDER FROM YOUR DEALER

Johnson & Johnson
LIMITED MONTREAL

MADE IN CANADA

NEWS AND NOTES

(Continued from page 72 of the advertising section)

collection centre operated in Toronto by the Canadian Red Cross Society.

Federal health officials stated that continued operation of the Chorley Park Depot should provide sufficient plasma for the preparation of 60,000 units of gamma globulin prior to the polio season of 1954 or between five and six times the amount expected to be available this year. Processing of the plasma to produce gamma globulin is to be carried out both this year and next at the Connaught Medical Research Laboratories, Toronto. Additional federal grants totalling more than \$152,900 have already been made to the Connaught Laboratories to help meet the costs of special equipment and the salaries of extra staff doing the laboratory work.

Because of the limited supplies of gamma globulin available this year, a committee containing representatives of provincial public health and research institutions and university medical schools has been set up to keep constantly in touch with the polio situation and to assure the most effective distribution of the limited stocks available. Federal health authorities state that in all probability this committee will continue to function in 1954.

The Chorley Park Depot was originally opened in 1951 at the request of the Department of National Defence to provide dried blood plasma for the use of the armed forces. When this assignment was successfully completed, the depot was to have been closed because the Canadian Red Cross Society lacked funds to continue its operation. This would have meant that little, if any, dried plasma for gamma globulin and for emergency requirement would have been available.

In addition to the blood fraction used for gamma globulin, health officials hope that other blood fractions may eventually be made available to meet other health problems.

The federal grant meets the salaries of the Chorley Park staff, the operation costs of mobile blood donor clinics and the purchase of technical supplies.

POLIOMYELITIS

Poliomyelitis now claims more of its victims among older children and young adults than in the past, the Metropolitan Life Insurance Company statisticians report on the basis of experience among the Company's industrial policyholders.

The period of maximum mortality among policyholders formerly was at the pre-school ages. It has now shifted to the early school years. This shift results from a trend toward lower death rates at the pre-school ages, in contrast to a rising trend in all other age groups up to mid-life. The increases in mortality from poliomyelitis have been relatively greater with advancing age.

The shift toward a higher age at attack is regarded by the statisticians as an adverse development because the proportion of severe cases is greater and the case fatality is higher at these ages.

Both in the insured group and in the general population of the United States the polio death rate has been higher in the past five years than in any corresponding period since the epidemic year of 1916. In the period from 1948 through 1952, the death rate among the policyholders averaged 1.2 per 100,000, compared with 0.9 in the preceding five years, 0.8 in the period of 1930 through 1942, and the record of 12.3 in 1916.

In the years since World War II, the statisticians note, the highest death rates for the general population have been recorded west of the Mississippi and in the northern states west of Ohio. The largest relative increases occurred in the Middle West. There are, however, 12 states in New England and the South, as well as the District of Columbia, in which the postwar rates are lower than, or unchanged from the prewar years.

In general, the situation with regard to polio is viewed as encouraging.

"Despite the rise in the death rate from poliomyelitis, the level of the rate is not at all high," the statisticians observe. "The vast majority of persons acquire natural immunity to the disease in childhood. Moreover, parents and the public generally are increasingly alert to the

early signs of the disease, and the prompt attention received by suspected cases together with the greatly augmented facilities for treatment contribute to its better control. Gamma globulin, providing temporary protection or reducing the severity of the disease, is being used to the limit of its availability, and recent research gives hope for the eventual development of means of permanent immunization."

ANNOUNCEMENT OF VAN METER PRIZE AWARD

The American Goiter Association again offers the Van Meter Prize Award of Three Hundred Dollars and two honorable mentions for the best essays submitted concerning original work on problems related to the thyroid gland. The award will be made at the annual meeting of the Association which will be held in Boston, Massachusetts, April 29, 30 and May 1, 1954, providing essays of sufficient merit are presented in competition.

The competing essays may cover either clinical or research investigations; should not exceed three thousand words in length; must be presented in English, and a typewritten double spaced copy in duplicate sent to the Corresponding Secretary, Dr. John C. McClintock, 149½ Washington Avenue, Albany 10, New York, not later than January 15, 1954. The committee, who will review the manuscripts is composed of men well qualified to judge the merits of the competing essays.

INTERNATIONAL NURSING CONGRESSES TO CONVENE IN BRAZIL

One hundred and fifty nurses from all countries of the Americas met in Rio de Janeiro, Brazil, on July 19 at the Third Regional Congress on Nursing. The congress is sponsored by the Pan American Sanitary Bureau, Regional Office of the World Health Organization, with the assistance of the Government of Brazil.

The two topics for discussion at the Congress were "Legislation for the Control of Nursing Practice" and "Nursing Education and Postgraduate Education in Nursing". Delegates participated in round-table discussions to evolve ways of improving nursing services and nursing education in their respective countries. Many of these nurses are supervisors of public health services and directors or instructors in schools of nursing. Some were sponsored by their governments, some by nurses associations, but many others interested in raising the standards of their profession attended the meetings at their own expense.

Preceding the Congress was the meeting of the International Council of Nurses held July 12 through 17 in Petropolis, a mountain resort near Rio de Janeiro. More than 1,000 nurses from all parts of the world attended.

The American Psychosomatic Society will hold its Eleventh Annual Meeting at the Jung Hotel in New Orleans on Saturday and Sunday, March 27 and 28, 1954. The Program Committee would like to receive titles and abstracts of papers for consideration for the program by December 1, 1953. The time allotted for the reading of each paper will be fifteen to twenty-five minutes. The Committee is interested in investigations in the theory and practice of psychosomatic medicine as applied to adults and children in all the medical specialties, and in contributions in psychophysiology and ecology.

The Program Committee requests that abstracts be submitted in quadruplicate to the Chairman, Dr. Geo. L. Engel at 551 Madison Avenue, New York 22, New York.

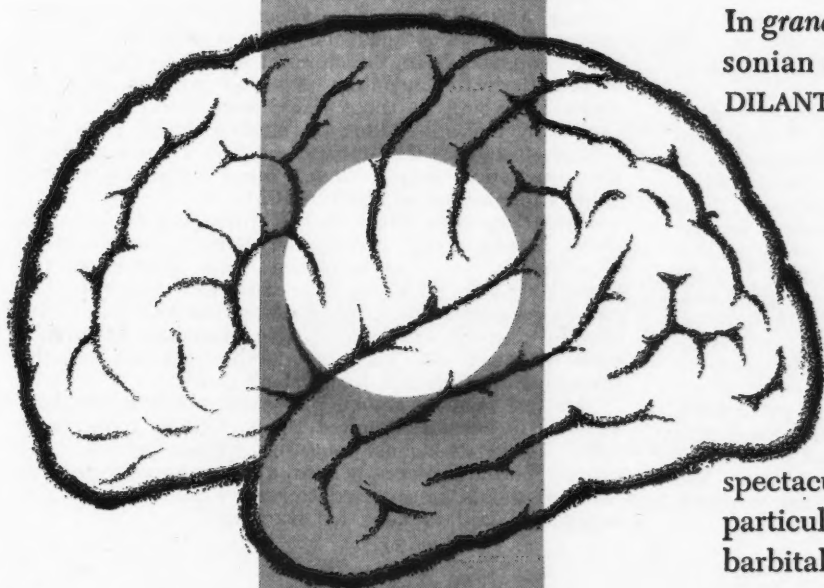
The 20th Annual Meeting of the American College of Chest Physicians will be held in San Francisco, California, June 17 to 20, 1954. Physicians interested in presenting scientific papers on any phase in the diagnosis and treatment of heart and lung disease should send a 100 word abstract, not later than January 1, 1954, to Dr. Edgar Mayer, Chairman of the Committee on Scientific Program, 850 Fifth Avenue, New York 21, New York.

(Continued on page 76 of the advertising section)

in the successful management of epilepsy...

DILANTIN[®]

a most effective and widely
used anticonvulsant



In *grand mal*, psychomotor seizures, Jacksonian epilepsy and focal convulsions, DILANTIN is a therapy of choice.¹ It "offers the special advantage of . . . specificity for the motor cortex . . . without producing dullness of apprehension, lethargy, and lassitude. . . ."²

DILANTIN "... is particularly adapted for use in combination . . ."³ and "... produces a spectacular result in *grand mal* attacks, particularly when combined with phenobarbital. . . ."⁴

DILANTIN Sodium (diphenylhydantoin sodium, Parke-Davis) is supplied in Kapseals[®] of 0.03 Gm. ($\frac{1}{2}$ gr.) and 0.1 Gm. ($1\frac{1}{2}$ gr.) in bottles of 100 and 500.

(1) Krantz, J. C., and Carr, C. J.: The Pharmacologic Principles of Medical Practice, Baltimore, The Williams & Wilkins Company, 1949 (Reprinted 1950), p. 518. (2) *ibid*, p. 515. (3) Carter, S.: Epilepsy, in Conn, H. F.: Current Therapy 1952, Philadelphia, W. B. Saunders Company, 1952, p. 612. (4) Salter, W. T.: A Textbook of Pharmacology, Philadelphia, W. B. Saunders Company, 1952, p. 231.



Parke, Davis & Company, Ltd.

WALKERVILLE, ONTARIO

NEWS AND NOTES

*(Continued from page 74 of the advertising section)*RESEARCH INTO GASTRO-INTESTINAL
DISORDERS AT UNIVERSITY
OF WESTERN ONTARIO

Research to determine the extent of gastro-intestinal disorders and whether or not they are increasing is being undertaken at the University of Western Ontario, London, with the financial support of a federal health grant. The study is being directed by Dr. B. C. Brown of the department of medicine, in co-operation with the department of clinical preventive medicine headed by Dr. G. E. Hobbs and with the radiology department of Victoria Hospital.

Information about the extent of the occurrence of diseases of the stomach and intestines in Canada is scant, public health authorities state, and, except for gastric and duodenal ulcers, even less is known about the extent of other specific gastro-intestinal diseases. Reports of studies made in England indicate that peptic ulcer is increasing, with a consequent demand on hospital beds and an economic loss to the patients.

The first part of the Western Ontario study is an analysis of statistical data accumulated by the department of clinical preventive medicine in an effort to determine the general incidence of gastro-intestinal disorders and to relate the findings to specific disorders, particularly to inflammatory, ulcerative and diarrhoeal diseases. The second stage will be an examination of the records of 26 Western Ontario hospitals and a comparison of the general and specific gastro-intestinal morbidity rates found there with those worked out by the statistical study. The third part of the study will be in co-operation with the radiology department of Victoria Hospital and will involve an examination of specific gastro-intestinal disease states and a cross-check between the rates of hospital admissions diagnosed as gastro-intestinal disease and the cases proved to be such by x-ray examination.

The study, expected to take about two years to complete, should throw new light on a little-known health problem, and should provide data useful not only to the medical profession but to hospital administrators and public health workers generally. Cost of the research this year will be about \$3,400.

AMERICAN HEART ASSOCIATION
MARKS ANNIVERSARY

The American Heart Association has marked its fifth anniversary as a voluntary health agency by awarding, jointly with its affiliates, an additional \$473,930.59 for 89 research grants-in-aid in the field of heart and blood vessel diseases. The latest awards increase to a grand total of almost six and a half million dollars the sums spent for research studies by the American Heart Association and its affiliated state and local associations over the five-year period. The following new grants (N) have been made in Canada.

Montreal.—G. Lyman Duff (N), Faculty of Medicine, McGill University. A study of the walls of the blood vessels for cholesterol and other fatty substances which are known to appear during the early development of experimental hardening of the arteries. \$6,819.75.

J. H. Quastel (N), Research Institute, Montreal General Hospital. Fat metabolism in heart muscle. \$5,512.50.

1954 COLLEGE ESSAY AWARD

The Board of Regents of the American College of Chest Physicians offers three awards to be given annually for the best original contribution, prepared by any medical student studying for the degree of Doctor of Medicine, on any phase relating to the diagnosis and treatment of chest disease. The first prize will consist of a cash award of \$250 and a certificate. The second and third prizes will be certificates of merit. The Essay award is open to all medical students in accredited medical schools throughout the world. The following

conditions must be observed: (1) Five copies of the manuscript typewritten in English (double spaced) should be submitted to the Executive Director, American College of Chest Physicians, 112 East Chestnut Street, Chicago 11, Illinois, not later than March 15, 1954. (2) The only means of identification of the author shall be a motto or other device on the title page and a sealed envelope bearing the same motto on the outside enclosing the name and address of the author. (3) A letter from the Dean or Chairman of the Department of Medicine of the medical school certifying that the author is a medical student studying for the degree of Doctor of Medicine and that the contents represent original work.

DROWNING ACCIDENTS

About two-thirds of the 700 accidental drownings of pre-school children each year in the United States occur among youngsters who are presumably safe at or near their home, statisticians of the Metropolitan Life Insurance Company report. One year olds account for almost 300 of all the drownings, a greater number than at any other single year of life.

Only a small proportion—about 5%—of the fatalities among children at ages one to four were reported to have happened while the children were playing either in or near the water at public or private pools, beaches, or parks. Drownings in these places were fewer than those caused by children falling off landing docks, piers, and similar structures, the statisticians note from a study of the experience among their young industrial policyholders for the period 1946 to 1951.

More than three-fifths of the drownings occurred in rivers, brooks, ponds, and similar bodies of water, many of which were on or near the home grounds of the victim, and an additional one-sixth took place in fish ponds, cesspools, septic tanks, wells, cisterns, and water troughs. Several children in the insurance experience were drowned in bathtubs while parents left the youngsters unattended for a short time.

"Most drownings among pre-school children could be avoided if parents watched their children more carefully," the statisticians point out. "Even at public or private bathing places where a life-guard is present, children should be advised to stay within range of his supervision and to heed his warnings."

WESTERN ARCTIC SURVEY FOR
TUBERCULOSIS COMPLETED

More than 900 Eskimos and 25 whites were given chest x-rays to detect tuberculosis during a survey recently completed in the Western Arctic by the Indian Health Services.

Thirty-four cases of tuberculosis were found among the 927 Eskimos x-rayed. These have all been brought to the Charles Camsell Indian Hospital, Edmonton, for treatment. Thirty-six other Eskimos were brought out for further observation or for treatment of diseases other than tuberculosis. Some of these were hospitalized at Fort Smith, while others were brought to Edmonton. More than half of them have already returned home.

Preparations for the survey were made months ago when radio messages were sent out requesting the Eskimos to gather at their respective trading posts around a specified date. The area covered included Coppermine, Read and Holman Islands, Cambridge Bay, Bathurst Inlet, Perry River, Gjoa Haven, Spence Bay and Pelly Bay. The survey was directed by Dr. Laurent Christensen, assisted by two x-ray technicians, George Berg and Chris Eskelson. It took a little more than two weeks to complete.

In former surveys a long interval elapsed between the taking of the x-ray film and having it developed and interpreted. As a result, many persons with tuberculosis returned to their hunting grounds and could not be reached again for months. In the meantime, the disease continued to develop and spread. This year arrangements were made to have the x-ray films developed and read on the spot and to have treatment begin immediately.

(Continued on page 78 of the advertising section)

CENTRINE

(Amoniopentamide Hydrogen Sulfate)

The NEW Anticholinergic and Antispasmodic with

GREATER SPECIFIC POWER

10 to 100 times more potent than current anticholinergic agents.*

INCREASED EFFECTIVENESS IN REDUCING...

GASTRIC SECRETION	GASTRIC ACIDITY	GASTRIC Ph.	GASTRIC MOTILITY
*20 to 40 cc. x 5 to 10 cc.	*35 to 40 units x10 to 15 units	*2.25 x4.25	*2.9 hrs. x4.2 hrs. *
Rate of gastric secretion per each 15 minutes.	Rate in clinical units.		Rate of gastric emptying measured by x-ray evidence.

* Before CENTRINE
x After CENTRINE

Satisfactory results were obtained in from 80 to 100% of the cases treated for the following: gastric ulcers and duodenal ulcers, pylorospasms, etc.

REDUCED COST

This most effective therapy is now available to all your patients at a very modest price.

INDIVIDUALIZED TREATMENT

CENTRINE SOLUTION: Tasteless — Highly concentrated drops permit accurate titration of individual response of each patient by gradual increase in drops dosage. Each 10 drops contains 0.5 mg. of CENTRINE.

CENTRINE TABLETS: 0.5 mg. scored. For routine treatment once the individual response has been established with Centrine Solution.

Trial CENTRINE combination package available upon request.

*References

Bolt, Bratt and Pollard
Journal of Gastroenterology
June 1953

Wollum and Pollard
Journal of Laboratory and Clinical Medicine
38: 238, 1951





PROCTOCAINE

For the treatment of Pruritus Ani, Anal Fissure, Neuritis, Lumbago, Sciatica and for use in Haemorrhoidectomy and minor Rectal operations.

"Proctocaine" is a combination of oil-soluble anaesthetics of low toxicity. These are combined so as to produce immediate local anaesthesia which is maintained for periods lasting from 7 to 28 days and longer by means of the slow, uniform absorption of its oily vehicle, and action of its oil-soluble ingredients.

"Proctocaine" is available in 2 c.c., 5 c.c., and 10 c.c. ampoules.

Complete literature on request.

ALLEN AND HANBURY'S COMPANY LIMITED
TORONTO, ONT. LONDON, ENG.

NEWS AND NOTES

(Continued from page 76 of the advertising section)

WORLD HEALTH ORGANIZATION FELLOWSHIP AWARDED TO OTTAWA NURSE

Miss Dorothy M. Percy, senior nursing consultant for the federal health department, has been awarded a World Health Organization travelling fellowship to study nursing programs in the United Kingdom and northern Europe.

She plans to investigate such questions as nursing education; the training and utilization of nursing assistants; public health nursing, particularly in rural areas; and the function of nursing divisions in governmental health departments. During her three months overseas she will visit the United Kingdom, Norway, Sweden, Finland, Denmark, The Netherlands and Switzerland. Earlier this year she spent a month studying similar problems in the eastern United States.

Miss Percy has been on the staff of the federal health department since 1947. Prior to the war, during which she served overseas with No. 1 Canadian General Hospital and later as matron of the Petawawa Military Hospital, she was for seven years a lecturer in nursing at the University of Toronto School of Nursing. She has also served with the Victorian Order of Nurses and on the staffs of the Toronto General and the Ottawa Civic hospitals.

MEDICAL RESEARCH FELLOWSHIPS

The Division of Medical Sciences, National Research Council, is accepting applications for postdoctoral research fellowships for 1954-1955. These awards are designed to offer research experience for promising individuals who look forward to investigative careers, and not to provide practical experience in the clinical field. Ordinarily Fellowships are not granted to persons over thirty-five years of age. The program includes:

Fellowships in the Medical Sciences, supported by The Rockefeller Foundation are administered by the Medical Fellowship Board of the Division. Fellows are expected to devote themselves to research in the basic medical sciences. The awards are open to citizens of the United States and Canada.

Fellowships in Radiological Research are administered by the Division's Committee on Radiology for the James Picker Foundation. The Foundation has expressed particular interest in the support of candidates who propose to carry on research oriented toward the diagnostic aspects of radiology. Appointments are not limited to citizens of the United States.

Applications for 1954-1955 under any of these programs must be postmarked on or before December 10, 1953. Fellowships are awarded in the late Winter or early Spring. Complete details and application blanks may be obtained from the Fellowship Office, National Research Council, 2101 Constitution Avenue, N.W., Washington 25, D.C.

BATTLE CREEK SANITARIUM

87TH YEAR OF CONTINUOUS SERVICE

A general medical institution fully equipped for diagnostic and therapeutic service. Close cooperation with home physicians in management of chronic diseases.

For rates and further information, address Box 50
THE BATTLE CREEK SANITARIUM BATTLE CREEK, MICHIGAN
Not affiliated with any other Sanitarium